

THE
ADVANCEMENT
OF
Arts, Manufactures, and Commerce;
OR,
DESCRIPTIONS
OF THE
USEFUL MACHINES AND MODELS

CONTAINED IN THE
REPOSITORY
OF
THE SOCIETY FOR THE ENCOURAGEMENT OF
ARTS, MANUFACTURES, AND COMMERCE:

ILLUSTRATED BY
DESIGNS ON FIFTY-FIVE COPPER-PLATES.
TOGETHER WITH
AN ACCOUNT OF THE SEVERAL DISCOVERIES AND IMPROVEMENTS
PROMOTED BY THE SOCIETY,

IN
AGRICULTURE, MANUFACTURES, MECHANICS,
CHEMISTRY, AND THE POLITE ARTS;
And also in the BRITISH COLONIES in AMERICA.

BY WILLIAM BAILEY,
REGISTER TO THE SOCIETY FOR THE ENCOURAGEMENT OF ARTS,
MANUFACTURES, AND COMMERCE.

Quid tandem non efficiant manus!

L O N D O N :

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and G. PEARCE, Bookfeller, in CHEAPSIDE.

MDCCLXXII.



TO THE
K I N G.

S I R,

ENcouraged by Your Majesty's known Attention to the
Advancement of every Useful and Polite Art, I have most
humbly presumed to lay before Your Majesty the Designs and
Descriptions of the Machines and Models placed in the Repository
of.

DEDICATION.

of the Society instituted for the Encouragement of Arts,
Aanufactures, and Commerce, for the Inspection of the Public.

The Benefits already derived from the Originals, give me Reason to hope that the Designs and Descriptions will be a means of still diffusing these Benefits through the extensive Dominions happily placed under Your Majesty's most auspicious Government: and if the Execution of a Work, necessarily attended with many Difficulties, should fortunately merit, in any Degree, Your Majesty's Approbation, it will ever be esteemed the greatest Happiness, by

Your Majesty's most Devoted

and most Dutiful Subject and Servant,

WILLIAM BAILEY.

THE
P R E F A C E.

IT was originally intended by the Society instituted for the Encouragement of Arts, Manufactures, and Commerce, to publish an historical register of their transactions; which was prevented by some occurrences, needless here to be mentioned. Part of this design (not the least laborious, possibly not the least useful) is here attempted; and I flatter myself, so far as the industry of an individual may presume on success, that a publication of the following Designs and Descriptions of the many useful and ingenious Machines and Models placed in their Repository, for the benefit of the public, will be a means of still extending this benefit, and co-operate, in some measure, with the truly laudable views of this patriotic Society.

The

The method I have taken, in digesting the materials of the present Volume, has been that of arranging the designs and descriptions of the several machines and implements, under those general heads of improvement to which they respectively relate. Thus, *Book the first, second and third*, relate solely to objects of AGRICULTURE; the *first* comprehending designs, descriptions and explanations, of the several ploughs and implements of husbandry preserved in the repository of the Society.

In the execution of the designs, also, care has been taken to represent not only the whole machine, but every material part of it, in such various points of view, as to enable the artizan to construct it from the description. To this end more plates than one have been found necessary in the explanation of some machines; in which case such plates referring to one machine, or model, are distinguished by numbers; as Plate I. Plate II. &c. To the perspective views, geometrical plans are also farther added, to facilitate the comprehension of the workman who would copy them in practice.

In the *second* Book is given a short account of such of the ploughs, machines and models, in the Society's repository of Agriculture, as
are

are not yet delineated ; and of course have not their descriptions assisted by designs on copper-plates.

Book the *third* contains a List of the Noblemen and Gentlemen, who, for their distinguished services in promoting the views of the Society, have been presented with honorary or pecuniary premiums, for improvements and discoveries in Agriculture and Husbandry.

Book *fourth*, *fifth* and *sixth*, comprehend the like designs, descriptions and explanations, of such of the Society's machines and models, as relate to Manufactures : the *fourth* containing such as are delineated on Copper-plates ; the *fifth* those not yet delineated ; and the *sixth* an enumeration of the premiums and bounties given by the Society, for employing the poor in parish workhouses, and for improvements in various branches of manufacture, as exemplified in the Table of Contents.

Book the *seventh* and *eighth* treat of ^{*}MECHANICS, and contain designs and descriptions of various machines and engines, contrived and improved for mechanical purposes. Among these are descriptions of various kinds of Mills, Cranes, Weaving-Engines, Hydraulic Machines, Ventilators, with many others ; together with a particular

particular Explanation of the Apparatus used by the Dutch in the Turbot and Cod Fishery.

The remainder of the present Volume relates to Chemistry ; our Colonies in America ; and the Polite Arts : for the particulars of which the Reader is referred to the following Table of Contents.



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B O O K I.

O F

A G R I C U L T U R E;

C O M P R E H E N D I N G

*Descriptions and Explanations of the several Ploughs,
and Implements of Husbandry, represented in the
Copper-plates hereto annexed.*

C H A P. I.

A Description of Mr. KNOWLES's Open DRAIN-PLOUGH.

PLATE I. FIG. I. *A perspective View of the PLOUGH.*

A, **T**HE Plough-share, is eleven inches and an half long from the point A to the shoulder or fore end of its flank B.

B, The Shank of the Share; its extreme length from B to S is three feet two inches, and two inches broad.

C, C, The width of the Share from C to C, is twelve inches
B and

and an half; the distance from the point A, to the angular points C, C, is one foot three inches and an half.

D, The Mould-board, is a compound inclined plane, and forms an acute angle at the point B (its tail end being elevated thirteen inches from the ground-rest or base-line S).

E, E, E, Three Coulters, each of them three feet long, three inches broad, and three quarters of an inch thick on their back edges, inclining to the horizon thirty-four degrees. The first Coulter is inserted into the Beam, four feet nine inches distant from the fore end, the two other Coulters are inserted into the curved arms, two feet nine inches (inside measure) distant from each other.

F 1st. The Tugg-chain, is fastened to the stock of the axle-tree with a strong iron staple, and to the beam with a round iron bolt.

F 2d. The Bridle-chain, is fastened with an iron staple to the beam, and also to the top rail of the carriage-frame.

G, The Beam, is eight feet four inches long, five inches and an half broad, and four inches and an half thick; the fore part of it is rounded off taper from the first Coulter to its upper end, inclining to the horizon seventy nine degrees.

H, A flat iron Collar, driven tight on the beam, and on the fore ends of the two curved arms, to prevent them from splitting.

I, An iron Cramp, or Brace, which serves to steady and fasten the curved arms to the beam: the ends of this Brace being welded together, pass through the fore ends of the arms, and are fastened thereto with a screw and nut, on the outside of each arm, and to the beam with a round iron bolt through it, close to the upper end of the middle Coulter.

K, K, Two curved Arms, three inches and an half broad,
and

and three inches thick at their fore ends: their back ends are mortised into the sides of the beam, and fastened thereto with an iron bolt and a wooden trundle.

L, L, Two Nuts and Screws, with which the welded ends of the brace are fastened to the curved arms.

M, A Wooden Trundle, one inch and an half in diameter: this Trundle passes through the beam and curved arms, to which it is fastened with wooden wedges.

N, The Share Brace, is one inch broad, and three eighths of an inch thick: this Brace passes through the beam and shank of the Share, and is rivetted into the mortise at Number 4; its hook is fastened to the upper side of the beam with an iron key or wedge.

O 1st. The Fore Sheat, is two feet six inches long, four inches and an half broad, and two inches thick, inclining to the horizon fifty degrees.

O 2d. The Hind Sheat, is two feet long, and three inches square, mortised through the beam and ground rest, inclining to the horizon forty degrees.

P, A wooden Trundle, two feet long, and one inch and an half in diameter: this Trundle passes through the beam, and is inserted into the Handles Q, Q.

Q, Q, The Plough Handles; their extreme length from the ground rest to their upper ends are five feet eight inches, and are distant from point to point two feet one inch.

N. B. Some people are of opinion that the handles would be better if they were sixteen or eighteen inches longer.

R, R,

R, R, Two wooden Wedges, which serve to set the mould boards to a proper projection.

S, The Ground-Rest, is three feet five inches and an half long; its width at the fore end is ten inches and an half; at the tail end nine inches, and four inches thick.

T, An iron Bolt, eleven inches long and three quarters of an inch diameter: this Bolt passes through the back ends of the curved arms and the beam, to which it is fastened with a screw and nut at one end of the Bolt.

a, The Axle-tree of the carriage; its extreme length is two feet six inches, seven inches broad (including the under rail of the carriage frame), and three inches and an half thick.

b, The under Rail of the carriage frame, is fastened to the stock of the axle-tree with wood-screws or nails.

c, c, The Carriage Wheels, are two feet three inches in diameter, and one inch and an half broad on the periphery.

d, A small Chain fastened to the middle rail; at the ends of this Chain are two iron pins, which serve to sustain the moveable rail and beam.

e, The moveable Rail, which supports the fore end of the beam, and serves to regulate the depth of the furrow by moving occasionally the two iron pins before-mentioned.

f, f, Two Stiles, mortised through the stock of the axle-tree and the upper rail of the carriage frame: these stiles are two feet four inches long, four inches broad, and one inch thick, with holes pierced through them at proper distances, to raise or depress the moveable rail.

g, The

g, The upper Rail of the carriage frame, to which the bridle chain F is fastened with an iron staple.

FIGURE II.

A Geometrical Plan of the PLOUGH-SHARE.

The Plough Share is four feet one inch and an half long from A to S, and twelve inches and an half broad from C to C; its thickness on the crest is one inch, gradually diminishing towards the edges, where it is only three-eighths of an inch thick: the length of its shank, from B to S, is three feet two inches; its breadth two inches.

The three Coulters E, E, E, are driven tight into the square holes 1, 2, 3, on the share, to which they are rivetted on its under side: the upper end of the fore Coulters is inserted into the beam, and fastened with wedges as usual in other ploughs: the two hind Coulters are also rivetted to the share as before mentioned; their upper ends are inserted into the curved arms K, K, and fastened thereto with iron wedges. See Fig. 1st.

The under end of the Share Brace N, is driven in tight, and rivetted in the square hole, Number 4; its upper end passes through the beam, and is fastened thereto with a feathered bolt or iron wedge, as represented in Fig. 1st.

The Shank of the Share is let in even with the under surface of the ground-rest, and fastened thereto with strong flat-headed wood-screws.

This

This Plough was tried with several others on *Wimbledon Common*, on *May 12, 1767*, in presence of the Committee of Agriculture, and many others; who were of opinion that it was preferable to the other Drain-Ploughs, as it is more simple in its construction, and performed its work more effectually. The Committee was therefore of opinion that Mr. KNOWLES (the inventor) was deserving the whole premium of 50*l.* to which the Society agreed *May 20, 1767*.

N. B. This Plough was first drawn by six horses, but as the ground was a little stony at the bottom, it was found necessary to add two horses more, with which a compleat ditch or drain was made, one hundred and fifty yards long, in three minutes: the drain was thirteen inches deep, twenty inches broad at the top, and ten inches broad at bottom.

C H A P. II.

A Description of Mr. MAKINS's Covered DRAIN-PLOUGH.

FIG. I. *A perspective View of the PLOUGH.*

A, **T**HE Beam; its extreme length is seven feet, four inches; its breadth, at the fore-share brace, is eight inches; and three inches and three quarters thick: the fore end of the beam is arched, and pierced through with small holes to receive an iron pin; by which pin the bridle and its tugg-chain, &c. are

are elevated or depressed, and set to the properest degree of elevation for drawing to the best advantage, and regulating the depth of the furrow; also for lifting the point of the share out of the ground when the Plough is not immediately in use, and requires to be moved from one place to another.

B, The Sheat, is three feet long (including its tenon) eight inches broad, and two inches and an half thick, inclining to the horizon fifty degrees.

C, An iron Directing Plate, fastened to the beam with a flat-headed iron bolt, and feathered key, or wedge; and to the shank of the share, with an iron rivet or screw, inclining to the horizon fifty degrees. In the middle of this plate there is a long mortise or aperture, which serves to direct and steady the fore end of the moveable mould board.

D, A concave iron Breast Plate, whose upper end is fastened to the beam, with a flat-headed iron bolt and feathered key; its under end is welded to the share, gradually diminishing towards its point: the Breast Plate is set to an angle of fifty degrees, and fixed in an oblique direction, the better to throw off the mould as it arises thereon.

E, A round iron Bolt, three quarters of an inch diameter, which passes obliquely through the beam, and the under end of the sheat; its use is to strengthen and steady the sheat.

F, A flat iron Brace; its under end is rivetted to a thin iron plate at the back side of the spring-board, its upper end to the left side of the beam, and fastened thereto with a round iron bolt and screw; this Brace serves to direct and steady the
fore

fore end of the moveable mould-board at the left side of the Plough. See Fig. 2.

G, A flat iron Brace, whose under end is let in, and rivetted to the shank of the share; and its upper end is fastened to the beam with a round-headed bolt, in the same manner as the iron brace E.

H, The Coulter, is three feet four inches long from the point to its upper end, one foot eight inches long in the blade, and one foot eight inches in the shank; the extreme breadth of the blade is two inches and an half; the shank is one inch and one quarter broad, and seven-eighths of an inch thick, inclining to the horizon seventy-five degrees; and fastened to the beam with wedges in the usual manner.

I, The iron Brace, or Stay, is one foot three inches long, and half an inch diameter: this Brace is hooked through the blade of the share, and passes through the beam, to which it is fastened with an iron key through a mortise or aperture in the upper end of the Brace.

K, An iron Bridle, or Tugg-Frame, fastened to the fore end of the beam, with a round iron bolt, which serves also as an axis for the bridle to turn on: the length of its arms from the bolt to its collar is one foot seven inches, their breadth one inch and an half, and three quarters of an inch thick.

L, A round iron Staple, driven into the side of the beam, to which is fastened a chain, with an iron pin, fitted to the holes in the arched head of the beam; and is used to fix the bridle to a proper degree of elevation for the purpose required.

M,

M, The Plough-Share; from the mouth of its socket to its cutting point, is one foot four inches long, its breadth and thickness two inches square, gradually diminishing towards its point, where it is one inch and an half broad, and one-eighth of an inch thick, including the breast-plate, or convex fence iron D, welded thereto.

N, A curved Iron Plate, or Sheath, two feet ten inches long, eight inches and three quarters broad at the upper end, and four inches and three-quarters at the under end: this Plate or Sheath is bent in such a manner as to embrace and fit the moveable mould-board in all the different degrees of its elevation: its use is to receive and direct the earth as it rises towards the mould-board, and prevent it from falling back into the drain, or on the under part of the fixed mould-board; the under end of the Sheath is loosely fixed with an iron pin rivetted to the share; in the upper-end, there is a small hole which matches with the rank of holes in the moveable mould-board; and when the plough makes the first cut, the Sheath is fastened thereto with the round flat-headed bolt Q, which, passing through the hole, No. 1, in the rank of holes, is fastened thereto with the pin R; when the plough is to make additional cuts, the bolt and pin are to be taken out, and the moveable mould-board shifted and fixed to the second hole, and so on to the third, &c. according to the different cuts it is to make.

O, An Iron Pin (in shape somewhat like the letter T). This pin bears on the directing Plate C, and moves easily up and down in the aperture, or long mortise; when the moveable mould-board is shifted from one degree to another, the pin is fastened to the under end of the mould-board with the screw and nut P. See Fig. 4.

C

P, The

P, The Screw and Nut of the double armed Pin, is fastened to the fore end of the moveable mould-board as before-mentioned.

Q, A round flat headed Bolt, with which the curved iron, or sheath, is fastened to the mould-board.

R, An Iron Pin, driven into a mortise in the end of the bolt Q, to prevent the bolt from getting loose.

S, An Iron Bolt, behind the fixed mould-board X, with which the two upper mould-boards are fastened together with a feathered key.

T, T, Two Chains, with which the bolts R and S are hung to the beam.

V, The moveable Mould-board, at the right side of the plough is three feet four inches long, eight inches broad, and one inch and three-quarters thick at its tail end.

U, The Ground-rest, is two feet six inches and an half long, two inches and an half broad, and half an inch thick.

W, The under Mould-board, is fastened to the sheat and handle.

X, The upper fixed Mould-board, is three feet six inches long, and eight inches broad at the tail end, projecting ten inches from the beam, where it is one inch and three-quarters thick.

Y, Y, The Handles, four feet eleven inches long, and three inches square at their under ends, gradually diminishing towards their upper ends, where they are one inch and a quarter diameter.

Z, An Iron Hook, to which the wheel carriage is connected, with a strong chain fastened to the middle of the axle-tree of the carriage wheels.

F I G.

F I G U R E II.

- A, The Beam.
- B, The Sheat.
- E, The Iron Bolt.
- F, The flat Iron Brace.
- G, A flat Iron Brace rivetted to the share.
- H, The Coulter.
- I, A round Iron Brace fastened to the beam and the coulter.
- K, The Bridle or Tugg-iron.
- M, The Plough-share.
- U, The Ground-reft.
- X, The upper fixed Mould-board.
- Y, The Handle of the Plough.
- Z, The Ring and Hook of the Bridle.

a, A moveable Mould-board, which serves to throw off any casual mould that may fall into the near side of the drain: at one end of this Mould-board there is an iron plate let in even with the surface of the board, and fastened thereto with flat headed wood-screws; the fore end of the plate is bent or doubled so as to make a flat hook, which occasionally slides up and down the perpendicular iron brace F, and serves to guide and steady the fore end of this Mould-board, when it is set to the height required; the tail end is fastened with a wooden pin or trundle through the Mould-board and sheat. See a, b, Fig. 1, 2, and 3.

b, An Iron Hook or Plate, fastened to the moveable mould-board.

F I G.

F I G U R E III.

The moveable Mould-board, with its wooden trundle a, and flat iron hook b, fastened to the left side of the plough.

This view of the Mould-board is taken from its upper edge, in order to shew the flat iron hook and the wooden trundle fastened thereto.

F I G U R E IV.

A view of the iron directing plate C, in which there is a long mortise or aperture for the double armed pin O, to slide up and down in, when the moveable mould-board V is set from one degree to the other.

This Plough was worked in a piece of ground belonging to — *Pearce*, Esq; at *Upton* in *Essex*, in presence of the Committee of Agriculture, *March* 30, 1770.

The Plough was drawn by six horses, two a-breast, and made two parallel drains, one of them three hundred and forty, the other three hundred and twenty feet, in all six hundred and sixty feet long, seventeen inches deep, five inches wide at top, and two inches and an half at bottom. The Plough went six times through the trenches to bring them to the depth before-mentioned, and performed it in thirty-four minutes, and twelve seconds. The length of the turn at each end was about twenty yards, and is included in the time above-mentioned.

The

The Committee was of opinion that Mr. *Makins* was deserving of a bounty of fifty guineas for the invention of his Drain Plough.

To which resolution the Society agreed *April 11, 1770.*

C H A P. III.

A Description of Mr. GEE'S PLOUGH with Six Shares and Coulters.

A, **T**HE Bridle or Tug-iron, to which the fwingle-tree is fastened; the shanks of the Bridle pass through the bed of the fore carriage G, and are fastened thereto with two iron keys or wedges, as represented in Fig. 4. Plate 1.

B, B, B, Three Carriage Wheels; the fore wheel is nine inches diameter, and the hind wheels are two feet three inches diameter, and six inches broad on the periphery; the fore wheel with its bed and cheeks are connected to the plough-frame with the perpendicular iron bolt U, which is the center of its horizontal motion when the Plough turns to the right or left.

C, C,

C, C, C, C, C, C, Six Shares (three only are seen in this view of the plough) their lengths are one foot three inches, including their flanks, their near edges are turned down at right angles with the horizon, from the point of their Shares to the end of their flanks; by this return of the edge of the Share, a rib or fillet of iron is formed one inch and an half broad to the near side of the Share; these ribs are the ground-ribs, to which the sheats and coulter are dove-tailed and fastened with wood-screws, as represented in Fig. 2. Plate 1.

D, D, D, D, D, D, Six Coulters, two feet nine inches long, two inches broad, and an inch thick, inclining to the horizon about thirty-nine degrees; their under ends are dove-tailed and screwed to the ribs of the shares, as before-mentioned. The upper ends of the Coulters and sheats pass through the curved rails of the plough frame, and are fastened thereto with the wedges V, V, V, as represented in Fig. 1 and 2. By this method of fastening the Coulters, they are less liable to vibrate or be out of order than common Coulters, and the share is fixed much better than with a share brace and hook: these Coulters are made different from the common Coulters, whose backs or curved edges are about an inch thick, gradually diminishing towards their cutting edges, by which shape they enter into the ground like wedges, as they really are; and if this plough was made with such wedge-like Coulters, it would require a much greater force to work it; which has been proved by repeated experiments made with a model of the plough, on a bed of stiff clay properly prepared for that purpose. These new-constructed Coulters (contrary to other Coulters) are one inch thick before, gradually diminishing towards their back edges, where

where they are but one tenth of an inch thick, and bevelled off to an obtuse angle before, (see Fig. 9.) where the Coulter is represented broken or cut afunder, the better to shew its angular form, which is found to enter into the ground more freely and with less obstruction, by the adhesion of the mould against its sides, than Coulters made the usual way.

E, E, E, E, E, E, The Six Sheats, to which the mould-boards are fastened, are two feet nine inches long, four inches and an half broad, and two inches thick, inclining to the horizon about thirty-nine degrees: these Sheats are fastened to the rib, or ground-reft, and plough frame, in the same manner as the coulters are. At the upper ends of the Sheats and Coulters there are indexes to direct how to regulate the depth of the furrow, and also to make the ridge more round or flat.

F, F, F, F, F, F, The Mould-boards; their extreme lengths are one foot three inches, and their breadths at their tail ends ten inches.

G, The Stock, or curved Bed of the fore Carriage, is two feet four inches and an half long, nine inches broad, and two inches and an half thick.

H, A curved Transom, is nearly of the same shape as the bed G, which is three feet one inch and an half long, one foot six inches broad, and five inches thick, to which the fore ends of the curved rails I, I, are halved, and fastened with wood-screws.

I, I, The Rails of the Plough-frame, are seven feet long (exclusive of their halvings or tenons) eight inches broad, and four inches and an half thick.

K, The upper Beam, is seven feet three inches long (exclusive of its tenons) four inches and three-quarters broad, and two inches

inches and an half thick ; its fore end is mortised into the curved transom H, and its other end into the hind transom R.

L, A Tongue, or flat Piece of Iron, eleven inches long, two inches broad, and one eighth and a sixteenth of an inch thick ; its under end is fastened to the beam K, and its upper end passes loosely through an aperture in the end of the curved lever N, to which it is also fastened with a round iron pin. The plough-frame and lever being thus connected, the shares, coulters, &c. are occasionally lifted up, when the plough is to turn about or be removed from one place to another.

M, M, Two Standards, or Pieces of Wood, one foot nine inches long ; their under ends ten inches, and their upper ends five inches broad, and one quarter of an inch thick ; these standards are halved into the under beam T, and fastened thereto with wood-screws ; their upper ends embrace the fore end of the curved lever N ; through the heads of the standards and lever is inserted a round iron pin, which is its fulcrum or center of motion.

N, A curved Lever, eight feet long, five inches broad and three inches thick at its fore end, gradually diminishing towards its other end ; this Lever being connected to the under beam T, serves to take the plough up and down when it is to be turned about or removed from one place to another, as before-mentioned.

O, An Iron Hook, or Half Staple, which serves to keep down the end of the lever when the shares and coulters are lifted up from the ground.

P, P, Two Slips, or Pieces of Wood, two feet one inch long,

long, three inches broad, and one inch and a quarter thick : the under ends of these Slips are mortised into the axle-tree of the hind wheels, to which they are fastened with wooden pins ; their upper ends pass loosely through two apertures in the hind transom of the carriage-frame, projecting ten inches above it : the indexes on the face of these Slips correspond with the indexes on the sheat and coulters, and are used for the same purpose, namely, to regulate the depth of the furrow, by elevating or depressing the carriage-wheels, sheats, shares, and coulters.

Q, Q, Two flat-headed Iron Screws and Nuts, whose length from their shoulders to their under ends, are one foot five inches, and from their shoulders to the top of their heads, seven inches : the nuts of these Screws are inserted into the axle-tree S, and the stem of the Screws are tapped only two-thirds of their length from their points to their shoulders ; the upper part being quite smooth, turn in the transom either to the right or left, without moving up or down, being confined thereto by the heads of the Screws above, and by the collet, and keys X, X, through the stem of the Screws below, as represented in Fig. 6. The Screws being thus confined, the upper carriage-frame is occasionally set to a greater or less distance from the wheels, by turning the heads of the Screws, whose nuts are inserted in the axle-tree. See Fig. 6.

R, The hind Transom, is three feet six inches long, (exclusive of its halvings to the curved rails I, I,) six inches broad, and two inches and an half thick.

D

S, The

S, The Axle-tree, is four feet six inches long, from shoulder to shoulder, six inches broad, and two inches and an half thick.

T, The Carriage-beam, is eight feet long, five inches broad, and two inches and an half thick; its fore end is seen in the front of the curved transom H, fastened to the bed of the fore carriage G; the other end is mortised into the axle-tree of the hind carriage, as represented at T, S, where the curved rail is broken, or laid open, as in Fig. 1, to shew this Beam, and the axle-tree S.

U, An Iron Rod, one foot four inches long, and one inch diameter; this rod passes loosely through the curved bed, the end of the beam T, and transom H; its under end has a round flat head, to prevent it from rising up through the bed, and its upper end has a screw and nut, to prevent the plough-frame from rising too high, when the shares, &c. are lifted up out of the ground.

V, V, Wooden Wedges, with which the coulters, sheats, &c. are set and fastened to the plough-frame.

W, W, Two Wooden Cheeks, eight inches and an half long, (exclusive of their tenons) six inches broad, and three inches thick: these Cheeks are mortised into the bed of the carriage, and are the conductors of the fore wheel. See Fig. 6.

F I G U R E II.

A perspective View of one of the SHARES, COULTERS, &c.

- C, The Share.
- D, The Coulter.
- E, The Sheat.
- F, The Mould-board.

P L A T E II. F I G U R E III.

A Geometrical Plan of the PLOUGH.

- A, The Bridle, or Tugg Iron.
- B, B, The hind Wheels.
- C, C, C, C, C, C, The Plough Shares.
- D, D, D, D, D, D, The Coulters.
- E, E, E, E, E, E, The Sheats.
- F, F, F, F, F, F, The Mould-boards.
- H, The curved Tranfom.
- I, I, The curved Rails.
- K, The Fixed Beam, mortised into the two tranfoms.
- L, A flat Piece of Iron, connected to the curved handle N, and the carriage beam T.
- M, M, Two Pieces of Wood, fastened to the carriage-beam, and is used as a fulcrum for the curved handle.
- N, The curved Lever.

O, The

O, The Hook which keeps down the curved Lever.

P, P, Two Slips of Wood fastened to the axle-tree of the hind carriage.

Q, Q, Two Iron Bolts, with screws and nuts, with which the carriage-wheels, &c. are set to the height required.

R, The hind Transom, to which the ends of the curved rails are fastened with strong wood-screws, &c. See R, Fig. 6.

F I G U R E IV.

A Geometrical Elevation of the PLOUGH.

A, The Bridle.

B, The fore Carriage Wheel.

C, C, C, C, C, C, The Plough-shares.

D, D, D, D, D, D, The Coulters.

E, E, E, E, E, E, The Sheats.

F, F, F, F, F, F, The Mould-boards.

G, The Stock of the fore Carriage.

H, The curved Transom.

I, One of the curved Rails.

V, V, V, V, V, V, The Wedges with which the sheats and coulters are fastened to the curved rails, and set to the height required.

L, One of the Slips of Wood with which the curved handle is connected to the carriage-beam.

M, The fulcrum of the curved Lever.

N, The

N, The curved Lever.

P, One of the Slips of Wood, on which there is an index for setting the carriage-wheels, &c. to the height required.

Q, One of the Iron Bolts with which the wheels, &c. are screwed up and down.

W, One of the Cheeks, which contain the fore wheel.

F I G U R E V.

A perspective View of one of the SHARES, COULTERS, SHEATS, and MOULD-BOARDS.

C, The Share.

D, The Coulter.

E, The Sheat.

F, The Mould-board.

F I G U R E VI.

A Geometrical Elevation of the HIND CARRIAGE, &c.

B, B, The Carriage Wheels.

I, I, The Ends of the curved Rails.

O, The Hook that keeps down the lever.

P, P, The Index Slips.

Q, Q, The Iron Bolts, Screws and Nuts.

R, The

- R, The hind Tranfom.
S, The Axle-tree.
X, X, The Collets and Keys.

F I G U R E VII.

A perspective View of the FORE CARRIAGE, &c.

- A, The Bridle, or Tugg-iron.
B, The fore Carriage Wheel.
G, The Stock, or curved Bed.
U, The Iron Rod, with its nut.
W, W, The Cheeks which contain the fore carriage-wheel.

F I G U R E VIII.

- A, The Bridle Iron, with its shanks and keys.

F I G U R E IX.

- D, A Representation of the Angular Form of the Coulter.

F I G U R E X.

A Section of the curved Lever N, Standards M, M, Tongue L, upper End and under Beam K, S.

This

This plough has been successfully used upwards of six years by the inventor, Mr. *Gee*, of *Langdon*, near *Litchfield*, who brought a model and description of it to *London*, in order to send it to a friend of his in *North America*, but before it was put on ship-board, Mr. *Gee* was so obliging as to lay it before the Society, permitting them to take a copy of his letter; and a model of the plough, which by order of the Society was executed by Mr. *William Bailey*, and deposited in the Society's Repository of Agriculture, for the benefit of the public; for which Mr. *Gee* had the thanks of the Society, *May 21, 1767.*

C. H. A. P. IV.

A Description of Mr. DUCKET'S Three Furrow PLOUGH.

FIG. 1. *A perspective View of the PLOUGH.*

A, **T**HE Beam, is eight feet three inches long, from the fore end of the beam to the shoulder of the tenon inserted into the left handle; its thickness at the tail end is four inches and an half, and two inches and a quarter at the fore end.

B, The

B, The left Handle, is six feet and two inches long, four inches broad, and two inches and an half thick at the bottom, tapering towards the point, or upper end, where it is one inch diameter.

C, The right Handle, is six feet and two inches long, and of the same breadth and thickness as the handle B: these handles are four inches distance from each other at the bottom, and two feet six inches at their upper ends.

D, D, D, Three Trundles; two of them are inserted into the handles above the beam; and the other at the bottom, six inches distant from their under ends.

E, A Wedge-like Piece of Wood, fastened to the right handle, to give the mould-board a proper projection.

F, The Mould-board, is two feet four inches long, ten inches and an half broad, and three quarters of an inch thick. The back end of the Mould-board is fixed to the right handle, and the fore end to the hind sheat.

G, An Iron Plate, two feet four inches long, and five inches and an half broad. This Plate and the mould-board are fastened to the right handle, and another Plate of the same dimensions is fastened to the left handle and hind sheat O: the fore ends of those plates meet in a point, and are rivetted together behind the share brace and hook: the ground-rest of the first plough is seventeen inches long, two inches broad, and three eighths of an inch thick; the back end is fastened to the right handle, and its fore end to the iron staple M, on the shank of the share. See Fig. 2.

I, I, I,

I, I, I, The Bolts and Wedges, with which the ground-rests and shanks of the shares are fastened to the handles.

K, The Share, is fourteen inches long, from its point to the shoulder, six inches and a quarter broad, and a quarter of an inch thick.

L, The Shank of the Share of the hind Plough, is sixteen inches long, two and a quarter broad, and half an inch thick: this shank is fastened to the left handle, with one of the iron bolts and wedges I, I. See Fig. 2.

M, An Iron Staple, welded to the shank of the share. See Fig. 2.

N, N, N, The Share Braces, are one foot two inches long, one inch and a quarter broad, and a quarter of an inch thick: the share-hooks are one foot long, and three eighths of an inch diameter; the screw part of the hind hook passes through the beam, sixteen inches distant from the shoulder of the tenon of the beam, inclining to the horizon forty degrees.

O, The Sheat of the hind Plough, is nineteen inches long, three inches and an half broad, and two inches thick; this Sheat is inserted into the beam ten inches from the shoulder of the before-mentioned tenon, inclining to the horizon forty degrees.

P, The Coulter of the hind Plough, is two feet nine inches long; this Coulter passes through the beam twenty-one inches distant from the shoulder of the beam; its angle of inclination is forty-five degrees.

Q, The hind Sheat of the Second Plough, is of the same dimensions as the sheat of the hind plough; its distance from
E. the

the shoulder of the tenon is two feet seven inches, inclining to the horizon fifty degrees.

R, The fore Sheat of the Second Plough, is of the same dimensions and inclination as the former; its distance from the shoulder of the tenon, or beam, is three feet two inches and an half.

S, S, The two Sheats of the fore Plough, are two feet one inch long, and of the same width and thickness as the other Sheats; the hind Sheat is inserted through the beam, four feet eight inches distant from the shoulder, inclining to the horizon about forty degrees. These Sheats are fixed to a proper height by two iron wedges driven into the upper side of the beam, as represented on the upper side of the Sheats.

T, T, Two Iron Plates, fitted to the two opposite sides of the beam, and rivetted to each other with iron pins through the beam.

V, V, V, Three Iron Plates, nailed to the upper and under side of the beam, to prevent it from splitting, or gulling.

W, A Gauge Wheel, nine inches diameter, and one inch and a quarter thick, with an iron staple and wedge to regulate the depth of the furrow, &c.

The P L O U G H - C A R R I A G E.

a, The Axle-tree, is thirteen inches and an half long, inside measure, from nave to nave, seven inches broad, and three inches and an half thick.

b, b,

b, b, Two Stiles, mortised into the upper side of the axle-tree; these Stiles are two feet long, three inches broad, and three quarters of an inch thick.

c, A flat curved Rail, eighteen inches long, five inches broad in the middle, and one inch and an half thick, with a mortise at each end of it, and a thin plate-iron across its middle surface; the upper ends of the stiles b, b, project about two inches above the rail, and are fastened thereto with wooden pins.

d, An Iron Rod, or Bolt, two feet seven inches long, and one inch in diameter; this Rod passes through a hole in the middle of the curved rail and iron plate, and also through the beam and iron staple in the axle-tree.

e, A moveable Iron Plate, supported by two iron pins, which are occasionally moved from one hole to the other, to rise or depress the beam; this plate is eleven inches and an half long, three inches broad, and a quarter of an inch thick; at each end of the plate there is an aperture, which embraces the two stiles b, b. The two pins are fastened to the Iron Plate, with a small chain, and serve to support the beam, and regulate the depth of the furrow, as before-mentioned.

f, The Tugg-chain: one end of this chain is linked over the hind sheat of the fore plough, and the other is fastened to a round staple driven through the end of the axle-tree.

g, The Bridle, or Notched Iron Tugg frame, thirteen inches long, one inch and an half broad, and a quarter of an inch thick; the arms of the bridle pass through the axle-tree, and are fastened thereto with two iron pins.

h, h, h, h,

h, h, h, h, Four Wooden Washers, or round Pieces of Wood, four inches diameter, and three quarters of an inch thick : these Washers are fitted loofely on the ends of the axis, and ferve to fet the wheels wider or clofer together, by adding more, or taking off the Washers at will.

i, i, Two Semi-circular, or hollow Wedges, with which the iron rod d is fixed to the beam, and properly fet to throw the plough more or lefs into the land.

k, The Wheel at the right fide of the carriage, is twenty inches diameter, and one inch and a quarter on its periphery.

l, The Wheel at the left fide of the carriage, is eighteen inches in diameter.

m, m, Two Iron Rings, three inches and an half diameter : these rings are occasionally shifted from one notch of the bridle to the other.

n, A Chain, which ferves to keep the carriage at right angles, with the points of the shares and coulter : one end of this chain is linked to an iron hook, and fastened with a screw and nut to the beam ; the other end to a hook, fastened in the fame manner to the end of the axle-tree.

F I G U R E II.

A Geometrical Plan of the SHARE.

H, The Ground-reft. See the description of Fig. I.

I, The Bolts and Wedges.

K, The

K, The Plough-share.

L, The Shank of the Share.

M, A Staple, welded to the shank of the share.

The Society gave Mr. *Ducket* a bounty of 50 l. for this and his Trenching Plough, *December* 23, 1767.

C H A P. V.

A Description of Mr. DUCKET'S TRENCHING-PLOUGH.

FIG. I. *A perspective View of the PLOUGH.*

A, **T**HE Beam, is six feet eleven inches long, five inches and an half broad, and three inches and an half thick at the tail end; the upper and under sides of the Beam are plated with iron from one coulter to the other.

B, The hind Sheat, is twenty-three inches long, five inches broad, and one inch and an half thick; its upper end is inserted into the beam, ten inches from the shoulder of its tenon, inclining to the horizon fifty degrees.

C, The Share-brace and Hook, with its nut and screw.

D, An

D, An Iron Bolt, or Brace, to steady the hind sheat.

E, The hind Coulter, is three feet long, three inches broad, and three quarters of an inch thick on the back edge, inclining to the horizon forty-eight degrees; its back edge is two feet three inches from the shoulder of the tenon, inserted into the left handle of the plough.

F, The hind Sheat of the fore Plough: its back edge is three feet two inches from the aforefaid tenon; its extreme length is two feet, breadth three inches and three-eighths, and one inch and a quarter thick, inclining to the horizon thirty degrees.

F 2d, The fore Sheat of the upper Plough: its dimensions and angle of inclination are the same as the hind Sheat of this Plough: the interval between the two Sheats is three inches and an half; the two wedges at the upper ends of those Sheats serve to set this Plough higher or lower at will.

G, The Share-brace and Hook, with its iron screw and nut, is one inch and three quarters broad, and three-eighths of an inch thick; the hook is half an inch in diameter.

H, The fore Coulter, is two feet seven inches long, three inches broad, and three-fourths of an inch thick on the back edge, inclining to the horizon thirty-eight degrees.

I, I, The Plough-shares: their dimensions are set forth in the description I, I, Fig. 2. and 3.

K, K, The Iron Ground-refts: their dimensions, &c. are set forth in Fig. 2. and 3.

L, L, The Bolts and Wedges, with which the ground-refts and the shanks of the shares are fastened to the Plough. See Fig. 1. and 2.

M 1ft, A thin

M 1ft, A thin Iron Plate, twenty inches long, and five inches broad: this plate is fastened to the mould-board of the fore-plough.

N, The Mould-board of the hind Plough, is three feet five inches long, thirteen inches broad, and one inch thick, projecting nineteen inches and three quarters, outside measure, from the left handle R, and fastened to the handle Q, and sheat B.

O, A Wooden Wedge, fastened to the handle Q, to give the mould-board a proper projection.

P, P, P, Three Wooden Trundles, with which the handles are fastened together; the under Trundle is not seen in this view of the plough.

Q, The right Handle, is fixed obliquely to the left, being four inches further from the point of the share than the left handle; the distance between the two handles is four inches and an half, at their under ends; and two feet eleven inches, inside measure, at their points, or upper ends.

R, The left Handle, into which the beam is mortised; distant from the shank of the share fifteen inches.

a, The Wheel at the right side of the carriage, runs in the furrow, and is twenty-one inches and an half in diameter.

b, The Wheel at the left side, runs on the land, and is seventeen inches in diameter.

c, The Stock, or Wooden-bed of the Carriage, with an iron axle-tree let in, and fastened thereto: its length from nave to nave is thirteen inches; seven inches broad, and three inches and an half thick.

d, d, Two concave Iron Wedges, fastened to the beam with
two

two small chains ; these wedges are occasionally made use of to fix the beam to the iron rod f, in such a manner as to throw the plough more or less into the ground.

e, A flat curved Rail, eighteen inches long, five inches broad in the middle, and three quarters of an inch thick : at each end of this Rail there is a mortise to receive the stiles g, g, and in the middle of it there is a round hole for the iron rod f to pass freely through.

f, A round Iron Rod, two feet seven inches long, and one inch diameter : this rod passes through the beam and curved rail, and a round iron staple in the stock of the carriage.

g, g, Two Stiles, two feet long, three inches broad, and three quarters of an inch thick ; their under ends are mortised into the stock of the carriage, and their upper ends into the curved rail e, projecting three inches above its upper surface : these Stiles are pierced through with small holes to receive two iron pins, which support the moveable rail, and regulates the depth of the furrow.

h, The moveable Iron Plate, or Rail, is eleven inches and an half long, three inches broad, and a quarter of an inch thick : at each end of this plate there is an aperture which embraces the Stiles g, g, to which it is fixed with the two iron pins before-mentioned.

i, The Bridle, or Iron Frame, is thirteen inches long, one inch and an half broad, and a quarter of an inch thick ; the arms of the Bridle pass through the stock C, and are fastened thereto with two iron pins, or wedges.

K, K,

k, k, Two Iron Links, or Rings, to which the cattle are fastened when the plough is set to work.

l, l, l, l, Four wooden Washers, four inches in diameter, and three quarters of an inch thick ; these Washers are fitted loosely on the iron axle-tree, and serve to set the wheels at a greater or less distance from each other, by taking off, or adding to the number of Washers on the axle-tree.

m, The Tugg-chain, is linked to the hind sheat G, and to a strong iron staple fastened to the stock of the carriage.

F I G U R E II.

A Plan of the HIND-SHARE, with its Shank and Ground-Rest.

I 2d, The Share, is one foot six inches long, and seven inches and an half broad.

K, The Ground-rest, is fastened to (T) the iron staple, welded to the shank of the share : its extreme length is two feet five inches ; its breadth two inches and an half, and one inch thick, gradually diminishing towards its fore end, where it is only one eighth of an inch thick ; its back end is fastened to the handle Q, &c. with the bolt and wedge L ; and the fore end, to the shank of the share, as before-mentioned.

L, L, 2d, The Iron Bolts and Wedges, with which the ground-rests and shanks of the shares are fastened to the handles, &c.

F

S 2d,

S 2d, The Shank of this Share, is two feet three inches long, measuring from its back end to the fore end of the staple.

T 2d, An Iron Staple, welded to the shank of the share to receive the under end of the sheat B, to which the fore ends of the ground-reft is fastened, as represented in Fig. 2.

F I G U R E III.

I 1ft, A Plan of the fore Share, with its shank and ground-reft: the share of the fore plough is one foot five inches long, and seven inches broad.

K 1ft, The Ground-reft, is thirteen inches long, and seven inches broad.

L, L, 1ft, The Bolts and Wedges, with which the ground-reft and shanks of the share are fastened to the plough.

S 2d, The Shank of this Share, is ten inches and an half long, from the fore end of the staple to the extremity of its shank.

T 1ft, The Iron Staple, to which the ground-reft K is fastened, and through which the under sheat F 2d, is inserted.

This Plough, and Mr. *Ducket's* three-furrow Plough, were tried on a piece of ground of Mr. *Arbuthnot's*, at *Martin-Abbey*, in presence of the Committee of Agriculture, and several other gentlemen, who were of opinion that the Inventor was deserving of a bounty of 50*l.* for the two Ploughs, to which the Society agreed, *December 23, 1767.*

C H A P.

C H A P. VI.

*A Description of Mr. WILLEY'S DRILL-PLOUGH.*PLATE I. FIG. I. *A perspective View of the PLOUGH.*

A, A, A, **T**HREE Carriage Wheels, two feet four inches diameter; the two hind Wheels are fitted to an iron axis, one inch square, with screws, nuts, holes, and pins, at each end, to set the Wheels wider or closer together.

B, A Conic Pulley, eight inches diameter at the base, and four inches and an half at the other end, having three grooves or channels on its periphery. This Pulley is fastened to the axis, and turns with the two carriage wheels.

C, C, Two flat Iron Rods, two feet long, one inch and one-eighth broad, and one-fourth of an inch thick, with holes and spring bolts to regulate the depth of the drill or furrow.

D, D, Two Barrels, or Seed-boxes, made of wood, or tin, one foot diameter, and three inches and three quarters on the periphery, with holes of different sizes suitable to the seed to be sown.

E, An Iron Axis, two feet four inches and an half long, and three quarters of an inch square, on which the barrels are fixed in such a manner, as to set wider or closer together, at will.

F, A

F, A Conic Pulley, (with three grooves) eight inches diameter, fixed to the upper axis, and connected to the under pulley by a woollen band, or string, which turns the feed barrels.

G, G, Two Beds, or sliding Boards, two feet long, six inches and three quarters broad, and three inches thick; the trunks H, H, and staves K, K, pass through those beds, and are fastened thereto with wooden wedges.

H, H, Two Taper Trunks, through which the feed is conveyed into the drills: their extreme length is two feet ten inches; breadth at their upper ends is one foot four inches, and thickness seven inches, outside measure; their under ends are four inches broad, and their back edges two inches thick, terminating in an acute angle at their fore or cutting edges. See the letter I, Plate 1. Fig. 1.

I, I, Two Iron Sockets, fastened to the under ends of the trunks; their fore edges form acute angles, and perform the office of shares and coulter; the channels in their back edges serve to convey the feed into the drills.

K, K, K, K, Four Wooden Staves, or Tines, which pass through the sliding beds, and are fastened thereto with small wooden wedges. These Staves serve as a harrow to cover the feed.

L, A Transom, or Cross Brace, mortised into the upper rails of the carriage-frame.

M, M, The Handles, with which the plough is held and directed.

N, N, The Handles, with which the plough is lifted up from the ground when it is to be turned about or removed from one place to another.

O, A

O, A Wooden Frame, or Bridle, with its iron hook and ring, to which the cattle are fastened: this bridle is permanently fixed to the upper and under rails of the carriage-frame, inclining to the horizon sixty degrees.

P, P, Two Transoms, or cross Braces, two feet three inches long, inside measure, three inches broad, and two inches thick. There is an aperture, or channel, cut in each of the Transoms, to admit the iron bolts, marked 1, 2, 3, 4, to pass through, and screw into the sliding beds G, G; by these bolts the beds with their trunks, flaves, &c. are fixed in such a manner as to make the drills of a greater or less distance from each other.

Q, Q, Two Iron Spring Bolts, fastened to the upper rails of the plough-frame, in such a manner that the tooth or pin in the middle of the bolts may freely enter into the holes in the iron rods C, C; their use is, to regulate the depth of the drills or furrows. See Q, Fig. 1. and Plate 2. Fig. 4, 5.

P L A T E II. F I G U R E II.

A Geometrical Plan of the PLOUGH.

A, A, A, Three Carriage Wheels, two feet three inches diameter; the iron axis of the two hind wheels is two feet two inches long, and one inch square.

B, A Conic Pulley, with angular grooves, eight inches diameter at the base, and four inches and an half at its vertex.

G, G,

G, G, Two sliding Beds, or Tables, which run in a groove, or channel, cut through each of the transoms P, P. These beds may be set closer or wider asunder, and properly fixed with the round-headed iron screws, marked 1, 2, 3, 4.

N, N, The under Handles, with which the plough is lifted up from the ground at the end of every bout, or turn, &c.

O, A Bridle, or Wooden Frame, with an iron ring, to which the cattle are fastened.

P, P, The two grooved Transoms, or cross Braces, which contain the sliding beds G, G.

F I G U R E III.

P, A Plan of one of the Transoms, with its groove or channel turned uppermost to shew its groove.

F I G U R E IV.

C, A Plan of one of the flat regulating Irons.

F I G U R E V.

A Plan of one of the Spring Bolts. See the explanation of Q, Q, Fig. 1.

This Plough with several others were tried on a piece of ground
at

at *Brumpton*, *April* 10, 1766, in prefence of the Committee of Agriculture, who came to a resolution to divide the premium of 50l. as follows: to the Rev. Mr. *Gainsborough* 30l. and to Mr. *Willey* 20l. to which resolution the Society agreed, *May* 14, 1766.

C H A P. VII.

A Description of the Rev. Mr. HEWETT'S HORSE-HOE and HARROW.

FIG. I. *A perspective View of the HOE and HARROW.*

A, **T**HE Share, is seven inches from A to A, fourteen from B to B, and three eighths of an inch thick on its back edge.

B, B, The curved Sides or Shoulders of the Share, are turned up at right angles with the face of the share; their extreme length is ten inches; breadth four inches, at their under ends, and two at their upper, inclining to the horizon about sixty degrees.

C, C, Two curved Irons, fourteen inches long, one inch and three-eighths broad, and a quarter of an inch thick: these Irons are connected to the shafts M, M, with the round iron bolt,

bolt, screw and nut D, and to the sides of the share with the two iron pins E, E, chained to the under ends of the handles K, K; these curved irons are pierced through with holes a quarter of an inch distant from each other, and serve occasionally to alter the inclination of the share, &c.

D, D, Two Iron Pins, four inches and an half long, and three-eighths of an inch thick, with square heads, screws, and nuts; these pins serve to fasten the curved irons C, C, to the shafts M, M.

E, E, Two Iron Pins, fastened with small chains to the under ends of the handles; these pins are occasionally moved from one hole to the other of the curved irons, when the inclination of the share is to be altered.

F, An Iron Frame, with two arms, and a travers, or cross bar, to which there are three tines, nine inches long, one inch and a quarter broad, and three-eighths of an inch thick: in the fore end of the arms there is a round hole for the bolt G to pass through, and admit the harrow to turn freely thereon.

G, A round Iron Bolt, with a square head at one end, and a screw and nut at the other; this Bolt serves as a brace to the two curved irons B, B, and as a spindle for the arms of the harrow to turn on; its extreme length is one foot three inches, and thickness five-eighths of an inch.

H, A Travers, or Wooden Rail, one foot one inch long, two inches and an half broad, and one inch and a quarter thick: this Rail is mortised into the handles of the hoe twelve inches distant from their nether ends.

I, A Rope, fastened to one of the handles of the hoe, and
to

to the cross bar of the harrow: this Rope serves to take up the harrow when the weeds are raked together in small heaps, at convenient distances to be taken up and carried off.

K, K, The Handles of the Hoe; their extreme length is three feet; breadth, at their nether ends, two inches; thickness, one inch and an half.

L, An Iron Bolt, or Brace, one foot three inches long, and three quarters of an inch thick, with a square head at one end, and a screw and nut at the other; this Bolt passes through the shafts, and is fastened thereto with a screw and nut, as before-mentioned.

M, M, Two curved Iron Shafts, three feet six inches long, one inch and an half broad, and three-eighths of an inch thick: in the fore end of each of these Shafts there is a hole to receive the round spindle or axis N: the Shafts are made straight from their points, back to the bolt L; and from thence, to the side-irons of the share, they are bent to a segment of a circle, whose diameter is sixteen inches.

N, A round Iron Spindle, or Axis, which passes through the nave of the wheel, shafts, and bridle P: this Spindle is one foot six inches long, and three quarters of an inch diameter, having a flat round head at one end, and a screw with a nut at the other; at each end of this Spindle there is a flat iron ring, or washer, between the head of the Spindle and the bridle, and another between the nave and the shaft.

O, The Carriage Wheel, is three feet diameter, and two inches broad on its periphery.

P, The Bridle, or round Iron, with an eye or hole in its

G

fore

fore end, to which the whipple-tree is fastened ; its inner ends are flatted and pierced with holes to receive the spindle, or axis of the carriage wheel ; the distance of these holes to the eye in its fore end is two feet three inches.

The Committee of Agriculture took into consideration the experiments made with this Horse-Hoe on *Kennington-Common*, the 24th of *May*, 1770 : Resolved—It appeared to the Committee, that the Rev. Mr. *Hewet*'s Hoe is very compact, and particularly convenient in turning on head lands ; and that its large wheel, and iron segments to gauge and regulate the depth of the Hoe in the ground, renders it preferable to the shims in common use ; but it was apprehended that the breadth of the share might be so contrived as to be set to intervals of different breadths. The Committee resolved to recommend to the Society to give their gold medal to the Rev. Mr. *Hewet*, for his communication of his Horse-Hoe : to which resolution the Society agreed *May* 30, 1770.

C H A P. VIII.

A Description of the Rev. Mr. HEWET'S HORSE-HOE, for destroying Weeds and Ant-hills, and also for cutting Turf.

FIG. I. *A perspective View of the HOE.*

A, **T**HE Frame of the Hoe, consisting of two ground-rests, two fills, two transoms, two posts, a cross rail and two handles.

B, B, Two Sills, two feet four inches long, three inches and five-eighths broad, and one inch and three quarters thick.

C, C, Two Transoms, nineteen inches long, (inside measure) mortised through the fills: the fore Transom is three inches and three-eighths broad, and two inches thick; the hind Transom is two inches and a quarter broad, and two inches thick, distant from each other seven inches and three-eighths.

D, D, Two Posts, two feet three inches long, two inches and an half broad; and two inches and a quarter thick; the under ends of these Posts are mortised into the fills B, B, and their upper ends are halved into the handles G, G.

E, E, The Iron Side, or Returns of the Share K, are one-fourth of an inch thick, sixteen inches long, three inches and three quarters

quarters broad at their fore ends, and two inches broad at their back ends; these sides are turned up at right angles, with the face of the share, and are fastened with two wood screws through each side to the curved ground-reefs F, F.

F, F, The two curved Ground-reefs, are fourteen inches and an half long, (from point to point) ten inches and an half broad, and one inch and seven-eighths thick; their under edges are shod with iron, to prevent the wood from wearing: on the outside of each of these Ground-reefs there are two plates of iron, with holes to receive two short iron bolts, with screws and nuts, which serve occasionally to set the share more or less into the ground, and to a proper degree of inclination, for the purpose intended.

G, G, The Handles, are mortised into the ends of the fills, and halved to the posts D, D, as before mentioned: their extreme lengths are four feet nine inches; their breadths at their under ends are two inches and three quarters; and their thickness one inch and an half.

H, H, H, Three Coulters; two of them pass through the fills and ground-reefs, the other through the transom C, and the share K, to which its point or under end is rivetted four inches and an half from its cutting edge: the two side Coulters are one foot ten inches long, two inches and an half broad, and three quarters of an inch thick, on their back edges, inclining to the horizon fifty-two degrees: the middle Coulters pass through an aperture in an iron plate, fastened to the upper side and edge of the fore transom C: the length of this Coulters is seventeen inches and an half, its breadth in the blade is two inches and an half,
and

and half an inch thick on its back edge, inclining to the horizon forty degrees.

I, I, I, Three Iron Wedges, which serve to set and fix the coulters to a proper depth and inclination: the middle wedge forces forward the shank or upper end of the middle coulters, till the iron plate on the fore transom C, enters into the notch intended to receive it; by which means both the share and the coulters are regulated and duly fixed.

K, The Share, is twelve inches and an half, from its point to the back edge, and from E to E, its returned sides, are twenty inches (inside measure.)

L, L, Two curved Iron Arms, twenty inches and an half long, and three inches and a quarter broad.

M, M, Two Iron Ears, welded to the curved arms, projecting horizontally one inch and an half from their upper edges, and elevated two inches and three quarters above the fells B, B, leaning a little towards the handles G, G, leaving an interval, or void space of one inch between the handles and the said Ears, when the share or hoe lies horizontally on the ground. The use of the Ears are to prevent the handles from rising too high; and the void space is intended to give room for the handles to rise and turn on the iron bolt P, till the share or hoe is set in a proper direction to enter into the ground.

N, An angular Tugg-frame; its fore ends are set off at right angles, and rivetted to the arms L, L, twelve inches and an half distant from the bolt P.

O, The Carriage Wheel, is two feet diameter, and two inches broad on its periphery; an iron spindle passes through its nave and the bridle Q, and the curved arms L, L. P, A

P, A round Iron Bolt, which passes through the fore ends of the fills B, B, and a round hole in the end of the angular tugg-frame N.

Q, The Bridle, is fifteen inches and an half long, from the swivel or hook, to the spindle or axis of the wheel.

R, The Travers, or cross Rail, nineteen inches long, (inside measure) two inches broad, and one inch thick.

F I G U R E II.

A Geometrical Plan of the SHARE.

E, E, The returned Sides of the Share, are three inches and three quarters broad, and turned up at right angles with the face of the share.

H, The middle Coulter, is seventeen inches and an half long, two inches and an half broad, and half an inch thick on its back edge, as before-mentioned.

K, The Share. See the description of K, Fig. I.

F I G U R E III.

A perspective View of the SHARE, with its middle Coulter.

E, E, The Sides of the Share.

H, The Middle Coulter.

K, The curved Plate, or Share.

This

This Horse-Hoe was tried at *Kennington-Common*, the 24th of *June*, 1770, in presence of the Committee of Agriculture; but some doubts arising whether the trial was properly made, and whether the machine was constructed agreeable to the model, the Committee postponed the further consideration of it; to which the Society agreed, *May* 30, 1770.

C H A P. IX.

*A Description of Mr. RINGROSE'S PLOUGH, for turning up
Heath Ground.*

A, **T**HE Bridle, is one foot long, fastened with an iron bolt through the fore end of the beam.

B, The Beam, is eight feet long, and four inches square at the tail end, diminishing from the first coulter to the fore end B, where it is only three inches square.

C, The Cleat, or Piece of Wood nailed to the side of the Cleat, is one foot eleven inches long, three inches broad, and two inches thick; in the side of this Cleat there are two notches,
or

or mortises, to receive the semi-circular tongues of the gauge and preffer D, F.

D, The Tongue of the Preffer, is three inches broad, and one inch thick; its upper end passes loosely through the fore mortise of the cleat, and is fastened thereto with an iron pin, which is its center of motion.

E, The Foot of the Preffer, or curved Gauge, is nine inches and an half long, from the heel to the toe, and seven inches broad, including its tongue. This Gauge serves to regulate the depth of the furrow, and to press or lay down the heath before the coulters and share.

F, The semi circular Tongue of the Preffer, is pierced with holes which are about half an inch distant from each other; its under end is mortised into the foot of the Preffer, and is raised or depressed by moving the iron pin which passes through it.

G, The Fore Coulter, is one foot eleven inches long, four inches broad, and three-fourths of an inch thick, on its back edge. This Coulter is set in a right line with the point of the share and the hind coulter, for which purpose it is bent, or turned off at right angles, under the beam, as represented in Fig. 2; but it is set in a contrary direction to the hind coulter, in order to press and cut the heath as it passes over it. Its angle of inclination is twenty-five degrees, and its cutting point is two feet seven inches distant from the point of the share, and four feet from the fore end of the beam.

H, The hind Coulter, is two feet long, four inches broad at the upper end, and one inch and an half broad at its point, which is one foot six inches distant from the point of the share, inclining to the horizon twenty degrees.

P, A

I, The Plough-share, is one foot two inches long, from its point to the fore end of the ground-rest, and ten inches and an half from its point to its shoulder; its extreme breadth is nine inches and an half.

K, A round Iron Bolt, or Brace, one foot ten inches long, and one inch thick, with a flat head inferted into the bottom of the ground-rest, and a mortise and key to fasten it to the upper side of the beam; its distance from the point of the share is nine inches and an half, and its upper end one foot nine inches distant from the tail-end of the beam.

L, The Mould-board, is two feet six inches long, one foot three inches broad, and one inch and an half thick: its tail-end projects one foot four inches and an half from the side of the beam, and is fastened thereto with a strong wooden trundle, which passes through it and the beam: it is fastened also with nails to the under part of the right handle, and another trundle through the sheat; its inclination to the horizon is ten degrees.

M, The Sheat, is two feet six inches long, four inches and an half broad, and two inches and a quarter thick: its fore edge is one foot one inch distant from the point of the share, and its angle of inclination twenty degrees; its under end is mortised into the ground-rest, and its upper end into the beam.

N, The Ground-rest, is one foot eleven inches long, from its tail-end to the socket of the share, four inches broad, and three inches thick.

O, A Wooden Trundle, driven through the under part of the mould-board, right handle, and ground-rest.

H

P, A

P, A Wooden Brace, mortised into the sheat and the under side of the beam.

Q, A Wooden Trundle, driven through the right handle and the beam.

R, R, The Handles, with which the plough is held and directed: the extreme length of the right handle from the ground-rest to its upper end, is five feet; its width at the bottom, four inches; and its thickness, two inches and an half: the length of the left handle is four feet one inch; its breadth, four inches and an half; and its thickness, three inches.

This Plough was referred to the Committee of Agriculture, who was of opinion that the addition of the fore coulter, the manner of its operation, and the particular use of the gage were new; and, from the testimony of Mr. *Hanbury*, very useful in breaking up heath ground.

A Description of Mr. RINGROSE'S THISTLE-CUTTER.

FIG. I. *Geometrical Plan of the MACHINE.*

A, The Whipple, fastened to the two ground-fills.

B, The double Chain, or Rope, two feet eight inches long, fastened to the whipple and the fore ends of the fills.

C, C, Two Scythes, three feet eight inches long, from point to point, and four inches and three quarters broad, at their fore ends,

ends, which meet in a point between the double chain, or rope, and are fastened to the fills with four wood-screws; their points or sharp ends extending three feet one inch from the joint of the fore hinge.

D, D, Two round Iron Staples, driven into the fore end of the fills, to which the double chain is fastened.

E, E, Two Iron Hinges, fastened with wood-screws to the upper surface of the fills.

F, F, Two Braces, two feet five inches long, two inches broad, and two inches thick, at their back ends, and one inch at their fore ends, where they are dovetailed, and let in even with the upper surface of the fills, and fastened thereto with wood-screws. There is an aperture, or mortise, fawed into the fore ends of the braces to receive the back edges of the scythes, which are fastened thereto with iron pins.

G, G, Two ground Sills, four feet three inches long, four inches broad, and three inches thick: these fills are parallel to each other, and are connected with two strong iron hinges, screwed to their upper surface; the fore ends of the fills are cut up a little slanting from their under sides, as represented in Fig. 2.

This instrument, by means of the double fills and hinges, may be used with both the scythes horizontal, or with one or both set to any degree of elevation, by which means any unevenness of the ground, or obstruction on its surface, such as stones, roots, ant-hills, &c. may be easily avoided; by this contrivance also, the scythes may with great facility be put into a proper position to be whetted, when there is occasion.

H, H, Two Arms, eight inches and an half long, from the
shoulder

shoulder of their tenons to their outer ends, four inches broad, and two inches and three quarters thick, mortised at right angles into the sides of the fills, and even with its upper surface.

I, I, Two Handles, six feet three inches long, and four inches square, at the bottom: with these handles the instrument is directed, and set to any degree of inclination, either to the right side, or left, or both.

F I G U R E II.

A Profile of one of the Sils, Handles, &c.

The Committee of Agriculture examined this instrument, and was of opinion that Mr. *Ringrose* deserved a bounty of ten guineas, on condition he would leave the model of the Heath-Plough, and the model of the Thistle-Cutter, as the Society's property; to which the Society agreed, *March* 16, 1763.

C H A P. X.

A Description of Mr. ARBUTHNOT'S Double FURROW- P L O U G H.

FIG. I. *A perspective View of the PLOUGH.*

A, **T**HE Share, is two feet two inches long, and fifteen inches broad, rising with an angular crest on the middle of its upper surface.

B, The

B, The Coulter ; its extreme length is three feet two inches ; its breadth is three inches in the blade, and one inch and an half in the shank, inclining to the horizon about forty degrees, and is four feet two inches distant from the point of the beam to the inner side of the mortise.

C, The Share-brace and Hook, with an iron key, or wedge, driven through a mortise in the upper end of it.

D, The Breast-plate : its height from the share to its upper or angular point, is two feet ; and at its back edge, eighteen inches ; its breadth at the top, is four inches, and at the bottom, nine inches, inclining to the horizon about forty-five degrees.

E, E, The Mould-board, or Iron Wings, are eighteen inches and an half broad on their upper ends, nineteen inches and an half broad at their under ends, and one quarter of an inch thick.

F, The Beam, is six feet nine inches long, from its fore end to the shoulder of its tenon ; the thickness of the beam is four inches and a quarter by three and a quarter at the shoulder of its tenon, which is inserted into the beam-post H. The whole length of the plough, from the fore end of the beam to the extremity of its handles, is eleven feet two inches and an half.

G, The Sheat, is two feet two inches long, five inches and an half broad, and one inch and an half thick ; its back edge is eleven inches and three quarters from the shoulder of the beam, inclining to the horizon forty degrees.

H, The Beam-post, is three feet two inches and an half long, four inches and three quarters broad, and three inches and a quarter thick ; its under end is mortised into the ground-rest ; in the middle of this post, there is a mortise to receive a tenon in the tail end of this beam ; the handles are also fastened to this post with wooden trundles, wedges, and nails.

I, I,

I, I, The Handles of the Plough, are two feet nine inches distant from each other at their points or upper ends.

K, An Iron Caliper, whose fore ends are fastened with the iron pins h, h, to the inner sides of the mould boards, or bended iron wings; the outer ends of the Caliper are pierced through with holes to receive the hook L, which serves to fix the Caliper, &c. to the degree of expansion required.

L, An Iron Hook, fastened to the beam-post H.

M, An Iron Ring, or Link, three inches diameter, which passes loosely through a hole in one of the arms of the caliper, and is laid over the other arm to fix the caliper, when the mould-boards are opened to their full extent.

N, The perpendicular Shank of the Gauge-plate.

O, A flat Staple, which embraces the shank of the gauge-plate, and the flat-headed screw P, with which the gauge is fixed as need requires.

P, A flat-headed Iron screw, which, passing through the staple O, and perpendicular shank N, screws into the end of the ground-rest R, and serves occasionally to elevate or depress the gauge.

Q, An horizontal Iron Plate, or Gauge, five inches square, and half an inch thick, with a perpendicular shank pierced through with holes to receive the iron screw, with which it is set to a proper degree of elevation.

R, The Ground-rest, is three feet four inches long, five inches and a quarter broad, and four inches thick; the extreme length of the plough, from the point of the share A to the end of the ground-rest R, is four feet four inches.

S, S, Two Screws and Nuts, with which the shank of the share is fastened to the ground-rest.—N. B. Only one of the Screws and Nuts appear in this view of the plough.

T, A round-headed Iron Bolt, sixteen inches long, and five eighths of an inch thick, with a hole through its upper end for an iron pin, or screw, to keep it in its place; this bolt passes through the eyes of the four iron plates or hinges V, V, V, V, which are properly fitted and rivetted to the breast-plate and iron wings, or mould-boards, and serves as a spindle for them to turn on.

V, V, V, V, Four Iron Plates, or Hinges, three inches long, two inches and a quarter broad, and three-sixteenths of an inch thick, rivetted to the breast-plate and iron wings.—N. B. Only one of those hinges are seen in this View of the Plough.

U, An Iron Bolt, or Brace, which passing through the ground-rest, beam-post, and beam, is fastened thereto with a screw and nut, to strengthen the tail end of the plough.

W, The flat-headed Iron Pin, or Screw, which passes through the upper end of the bolt, or spindle T.

X, X, X, Three Clamps, or pieces of Iron fastened to the beam, to prevent it from splitting.

Y, An Iron Hook, fastened to the upper end of the beam, and is occasionally set in the holes of the curved gauge, to regulate the depth of the furrow.

Z, An Iron Gauge, or Regulator, being a segment of a circle, pierced through with holes. This segment is about an eighth part of a circle, whose radius is three feet four inches, two inches broad, and three quarters of an inch thick: its shank is three feet, two inches long, and one inch square, with a hole at its extremity, for the hook d to pass through.

a, a, The Carriage-wheels, are two feet in diameter, and two inches broad on their periphery.

b, An Iron Axle-Tree, twenty inches and an half long, and
one

one inch and an eighth square in the middle, with a small shoulder on each face, for the under end of the segment to bear against, to which it is fastened with a feathered bolt or wedge thro' the axle-tree.

c, c, Two Wooden Ferrils, or Washers, four inches in diameter, and one inch thick: the use of these washers is to set the carriage-wheels at a greater or less distance from each other, as occasion requires.

d, An Iron Hook, which passes through a hole in the end of the shank of the gauge, and serves to fix the axle tree, gauge, &c. to the beam, to which it is fastened with strong wood-screws.

e, An Iron Plate, fourteen inches long, two inches and an half broad, and three-eighths of an inch thick. This plate is fixed in an horizontal position close under the caliper; its fore end is turned down flanting, and fastened to the sheat G; its tail end is turned up, and fastened to the beam-post H: in the middle of this plate, there is an aperture thirteen inches long; its use is to guide the iron pin f, and regulate the motion of the caliper, &c. this plate serves also as a brace or stay to the beam-post and sheat.

f, A round-headed Iron Pin, with which the caliper is connected to the directing plate e: the under end of this pin, passing through the aperture in the plate, is thereby directed so as to procure a regular motion to the caliper, mould-board, &c. See Fig. 6.

g, g, Two Iron Plates, with two horizontal ears rivetted to each of them: these ears embrace the fore ends of the caliper, and is connected thereto with the iron pins h, h, one of which is only seen in this View.

FIG. 2. *A perspective View of the AXLE-TREE, &c.*

b, The Shoulder, against which the segment is fixed.

FIG. 3. *A Plan of the SHARE and its SHANK, &c.*

A, The Share.

S, S, Two Screws, with which the shank is fastened to the ground-rest.

FIG. 4. *An Elevation of the GAUGE, or REGULATOR, with its Shank.*

Z, The Segment, or Gauge.

FIG. 5. *A perspective View of the TAIL-GAUGE, STAPLE, &c.*

N, The Shank of the Gauge.

O, The flat Staple.

P, The flat-headed Screw.

Q, The horizontal Plate, or Gauge.

FIG. 6. *A Plan of the CALIPER, &c.*

e, The Guide-Plate.

f, The Center Pin of the Caliper.

K, The Caliper.

L, The Hook.

M, The Iron Ring.

FIG. 7. *A perspective View of the HINGES, and IRON PLATES, with two Ears, &c.*

g, The Plate, with its ears.

h, The Iron Center-Pin which passes through the ears.

FIG. 8. *A View of the BOLT and HINGES of the Mould-Board.*

T, The Iron Bolt.

V,V,V,V, The Plates, or Hinges.

W, The flat-headed Iron Screw.

The following is a Copy of Mr. CUTHBERT CLARKE's Account of his new constructed PLOUGH, sent to the Society for the Encouragement of Arts, Manufactures, and Commerce.

“ **A**S the line of traction is of very great importance to be well considered, in order to form a true idea of the principles of constructing a plough upon a rational theory, I shall attempt in the first place to explain its properties; first, as it affects the horses which draw the plough; and secondly, in what manner it affects the plough

“ As the shoulders of these kind of horses, which are allowed the most proper for ploughs, &c. generally lay at an angle of about ten degrees thirty minutes, computed from a perpendicular, as A, B, C, in Fig. 1. in order to have the collar impinge upon the greatest surface of the shoulders, (a thing absolutely necessary to preserve the skin upon their shoulders, &c.) and to give the creatures the best chance for respiration, and using to the greatest advantage their muscular force, the line of traction ought to lay at right angles, to that which their shoulders make with a perpendicular, as abovesaid.

“ A demonstration of the above assertions, which I believe deserves the authority of axioms, would require a more copious description of the mechanism of a horse, &c. than the nature of this essay will admit of, therefore must leave any further remarks

marks to be determined by observation, &c. The angle of the line of traction to intersect the angle of the shoulders, ought therefore to make an angle with the horizon of ten degrees thirty minutes, as F, Fig. 1.

“ Having fixed the line of traction, and shewn what appears to me to be the good effects of this position in regard to the horse, &c. I shall consider in the next place its effect upon the plough.

“ The place of contact of the line of traction and plough ought, if it were practicable, to be at the point of the share, as at or near that point the center of percussion lays : but as it is impossible the line of traction can be connected at that point without interrupting the operation of the instrument, another point must be substituted, and in course ought to be as near to the point of the share as the convenience of the instrument will admit of, for the greater the distance, the longer the lever, and consequently the more powers the share, &c. gain; and their powers have a tendency to sink the share into the ground rather than communicate to it an horizontal motion. To fix this distance, as I said before, there is no certain rule, but that it must be the least the convenience of the instrument will admit of, and that, I humbly presume, cannot be less than fourteen inches in a plough which is to perform only common work, taken perpendicular above the point of its share, as the line D, E.

“ From the above considerations, it must be absurd to connect the line of traction at an angle behind the point of the share, as it unavoidably either loads the wheels unnecessarily, by giving the share too great a tendency to sink in to the ground ; or if no wheel, causes
the

the tail of the plough to rise, so as to make it hop as it were upon the point of the share ; either of which gives the balance cruelly against the horses, fatigues the holder, and spoils the land. The line of traction being fourteen inches above the point of the share, at the point of contact with the plough, and upon the shoulder of a horse fifteen hands high, will be about four feet one inch above the surface of the tract the horse treads upon : * the line of traction will be similar to the line F, G, in Fig. 1. and the distance between these two points is fourteen feet six inches, of which six feet must be allowed for length of beam and caps ; (the necessity of which will be shewn hereafter ;) then remains eight feet for the horses body, whipples, &c. a space I humbly presume very convenient for a horse of the above size, and if longer, and requires more length, or smaller, and can do with less, the position of the line of traction remains the same, because this angle is proportioned to the mean height. The position and length of the line of traction being ascertained, I shall next point out how the powers the elevation of the place of connection of the line of traction give to the share, which have a tendency to make the share sink too much into the land, must be countervailed both in the sowing and wheel-ploughs.

“ And first, of the sowing plough ; the method to countervail the above-mentioned bias in this plough, depends upon the length and position

* I would not be understood to mean that this is the precise point that every horse of that height should pull at ; for there is a great difference in the depth of the chests of horses, and regard ought to be paid to that ; but in general the above height will answer very well, as hereafter shewn.

position of the beam, and place of connection of the line of traction; for, by the beam being kept low at the point where the line of traction connects, the horses, &c. have a purchase to countervail the bias; and as this commonly is or ought always to be limited by the conveniency of the instrument, which I shall suppose may be fourteen inches above the surface of the land at the end of the beam, and the same height above the point of the share; I shall also suppose that the line of traction is elevated at the horses shoulder four feet and one inch, as in the above computation; then we have a balance of twenty-nine powers in favour of the countervailing power.* This will be sufficient to overcome all the resistance the share and coulter meets with, &c. when the soil is yielding, which are the only seasons the sowing-plough can be used to any purpose; for when the soil is stubborn, or a great depth to be ploughed, a more effectual contrivance to countervail the bias, which the share, &c. has required, by the resistance of cutting and raising the furrow, and by the elevation of the place of connection of the line of traction, must be applied.

“ And of all the simple mechanical powers, I cannot see any better suited to answer the purpose than the beam O, being a lever of the second kind, with its fulcrum R, Q. It is true, a prop, or fulcrum, let fall from the point M, upon the line of traction at N, were the line of traction inflexible, and no obstacle at
the

* Taking the plough to be six inches within ground, or making a furrow six inches thick; the fourteen inches above the surface, and those six make twenty, which, subtracted from forty-nine, remains twenty-nine, as above: a further demonstration of this will be given in the explanation of the countervailing power of the wheel plough.

the point of the share, that the plough would keep its bottom D, S, in an horizontal direction, because the angle M, N, E, and D, M, E, are similar, and the line of traction passes through the center of gravity of the figure they constitute; but as the obstacle upon the share, &c. occasioned by cutting and raising the furrow, &c. is so very great as almost to equal the effort of the whole moving power, there is the greatest necessity to provide further against that bias, by continuing the beam O to the greatest distance the conveniency of the instrument will admit of; which I humbly presume is at P, and there let fall the prop, or fulcrum R, with its wheel Q, whose diameter should be the greatest the space between the top of the furrow, which is to be cut, and the beam will admit of, because the force required to draw a wheel over an uneven surface, is inversely, as the square root of the diameter of the wheel. What is further necessary to be relative to the explanation of the appendage of this wheel, as the use of the appendage is chiefly for regulating the depth of the furrow, &c. I shall defer until I come to mention the other regulating parts, and proceed to explain the method of abating the friction of the coulter and share, and the parts concerned in turning the furrow, as follows:

“ The edges of the coulter and share, as they cut the furrow from the ridge, ought to be placed at such angles as would give them the greatest advantage, which might be ascertained precisely, were the velocity of the moving power and the resistance of the soil always of one tenor; but as there is no certainty to be obtained with regard to the degree of velocity the plough may have, nor can unvariableness in the resistance of soils, it will be useful to attend

attend a little to practice as well as theory, to hit upon the best general position for the cutting parts to be laid to ; and the result of my endeavours for that end has determined me to fix upon an angle of forty-nine degrees with the horizon, for the edge of the coulter to be laid to. See D, Fig. 1.

“ The coulter, besides this angle, I presume, should likewise have its point, that is, as much of it as goes within the ground, bent sideways to an angle of about ten degrees, the point inclining to the furrow. The use of this sideways angle is to cause the furrow to rise with more ease, by its being cut rather from above the land than below it, as is too often the case in practice, the coulters being generally set to an angle of about the same quantity in the contrary direction, which must wedge the coulter against the land-side of the ridge, as the share raises it up : besides this advantage, another no less material will be obtained by the coulter’s being bent to the above angle, with its point to the furrow side, as aforesaid ; for when the furrow, with its under edge in turning, comes to rest upon the bottom of the trench, being cut angular, it will be quite free from bearing upon the other edge, until the furrow is laid in its proper position, which abates the resistance against the wrist-board of the plough very considerably ; and in taking up lays will prevent the furrows from falling down, because the angle and the coulter cut the edge of the furrow which lays undermost to, serves to rest it upon, and the center of gravity of the furrow being without the perpendicular, the angular point serves as a fulcrum to counter-act the elasticity and springiness of the turf.

“ The share in course falls next to be considered ; the figure to render it the most complete for cutting, and laying an equal stress

strefs on the plough, when a thin furrow is to be cut, and the soil yielding, would be such a curve as a, b, c, Fig. 2.

“ But, as stiff or gravelly soils require to be pointed, I have found the figure which suits best in general, to be such as a, d, c; but however far it may be found necessary to alter the point of the share in regard to length, or taper, at all events the fin c ought to be held the full width of the furrow, especially in taking up lays in order to cut the furrow thorough; otherwise a part of the land must be torn up by the wrist-board of the plough, which retards the motion very considerably, and often leaves slips of land unmoved, which is not only unsightly but detrimental.

“ The furrow being now cut, the method to turn it completely at the least expence of force ought next to be pointed out; and that sort of wrist-board, which I have found to answer best, is a compound inclined plain, whose base lays horizontal, and hypotenuse subtends an angle thereto of nineteen degrees; the perpendicular ought to be a fourth more than the width of the furrow, and the greatest or extreme projection at the haunch from the land side of the plough, taken upon a horizontal line, ought to be one-third more than the width and thickness of the furrow, which is intended to be turned; and the furrow side of the chip made exactly parallel to its land side, and eight-tenths of the width of the intended furrow in width. Nothing more is to be done to complete the wrist-board, but to work it to a regular twist, from the point of the share to the haunch, or extreme point of projection, to which the share should truly correspond as far as it extends, and if of that sort commonly called pan-shares, they may easily be made to answer that purpose. Thus a wrist-board
may

may be constructed which has all the requisites for turning a furrow, without any unavoidable resistance or pressure.

“ The principles the above are deduced from are as follow, viz. The angle of nineteen degrees (which answers nearly to one inch of rise, in three inches in length) cuts the perpendicular at the point where the furrow lies; its center of gravity begins to diverge (being projected by the extreme point or haunch) the full distance of the width of the trenchor furrow, and thickness thereof; and as the furrow is twisted from the point of the share upon its one edge to the said point of extreme projection, the angle of nineteen degrees continues it upon the compound inclined plane, just space enough to reduce the elasticity of its parts, and the same of its thickness, and width of the furrow; as it is not shoved off its place below, must, if the under edge was even cut square, put the furrow in equilibrio; but as it was by the sideways angle of the coulter cut angular, and the apex acting as its fulcrum, the center of gravity becomes sooner in equilibrio: and lest any accidental obstacle should prevent the work being completed, a third of the width and thickness of the furrow is allowed over and above what seems sufficient by calculation; and to prevent crumbs of soil from rushing in upon the body of the plough, a fourth more than the height of the furrow is proposed; all which in practice have their uses: and as I have had many wrist-boards made upon this principle, which in every kind of soil did the part of turning the furrow very completely, I have been bold to say the construction has all the requisites for turning the furrow without any material waste of force, &c.

“ Having described the furrow side, I shall next consider the land

K

side,

side, which, from the point of the share to the tail of the plough, is commonly about three feet long, in the common construction, and stands parallel to the land, and rubs against it in every part, which occasions a great deal of friction. The reason that ploughmen give for the chip or share being continued to such a length, is, that it gives the plough steadiness, as they call it; but from experience I can affirm, that a plough, when other matters are ordered as above, goes as steady when its land side is but half that length: by thus shortening the land side, the friction is made so inconceivable that it is not worth providing against by a friction wheel, &c.

“ The friction which the bottom of the plough, as it is a sled in the common construction, comes next under consideration, which I propose to abate by converting it into a wheel-carriage * in the following manner :

“ That part of the share which is within ground, and those of the chip or foal of the plough, are loaded with the resistance of cutting the furrow, and that of its weight in turning it over, &c. and has the bottom of the furrow, or rather trench, for its basis, which is generally very rugged, consequently the friction must be very great, as appears by the wear of those parts: now as the friction upon a sled, *cæteris paribus*, is to the friction upon a wheel-carriage in the proportion of the diameter of the wheel to the diameter of the axle-tree, the longer the wheel, or wheels are, that are applied, and the smaller the axle-tree is, the better: but convenience is the criterion to determine that; and the nearer the point of the share the

* This I tried sixteen years ago with some success (though not in the manner hereafter described); and one of the ploughs is now in being that was made at that time.

the wheels are fixed (as the greatest pressure is there) the more advantage they will give ; and therefore I would have them to move on the outside of the plough, for within the plough at a less distance than eighteen inches from the point of the share, no wheel of a sufficient diameter to abate friction to any amount can be placed. The method I use to apply the wheels at a less distance from the point of the share, and of a diameter which will abate the friction above twenty times, is to pass a strap of iron X, X, from the chip Y up to the beam. This strap, as it folds below the chip, and is firmly connected to the beam, contributes very much to the strength of the instrument, as it lays at right angles to the top of the share: through this strap and the beam is a mortise of an inch and a quarter square ; into this mortise an iron axle-tree is put in an horizontal direction, and at right angles to the land side of the plough ; on each end of this axle-tree is put a wheel of two feet diameter, about twenty-two inches apart (from the inside of one to the inside of the other) ; that which goes in the furrow is made dishing a good deal, which prevents its being in the way of the furrow when turning. There is a contrivance to raise or lower any of those wheels at pleasure, by means of hand screws, and fore locks. I prefer having wheels of equal diameters to that of a high wheel and a low one, because the high wheel gains upon the low one continually, and thereby twists the plough out of its true direction, if not counterbalanced by the moving power, which is employing it very improperly upon those wheels on which the whole weight of the body of the plough, &c. rests ; and as their centers are nearly perpendicular to the point of the share, and all parts of the share being so effectually braced up,

the

the wheels become the basis of the share and plough, and always keep the bottom of the plough level, and therefore must form a furrow of an equal dimension in all its edges. It is true the ploughman cannot quite so easily twist the coulter to or from land by the handles when wheels are used in the above method, as when there are none: but although this ought chiefly to be regulated by the horses, &c. yet a temporary agent has its conveniences, and instead of wrenching the handles, as in the common construction, the ploughman is to shove a tiller, as V, in Fig. 1, a little to the right, or left, which by a very simple piece of machinery turns the wheel Q to right, or left, as need requires; and upon the principle that a three-wheel cart, &c. turns the wheel Q, twists the head of the beam, and consequently the coulter into land, or the contrary instantly, without altering the thickness of the furrow, which is too often the case in the common construction. The parts concerned in producing this effect are the block L, which is moveable upon a spindle; the tiller V is fixed into this block, but not the spindle: and to this block is likewise fixed two pieces of jack-chain, H, H, which are connected with the levers I, I, which have their fulcrums screwed into the cops or stand R, P; their lower ends have mortises in them, which take in the ends of the axle-tree of the wheel Q, which is round, and slides backwards and forwards in the mortises in the caps, which are about two inches long. When the levers are not drawn by the chains, the wheel revolves in a direction parallel to the land side of the plough, and its axle-tree rests against the ends of the mortises at right angles to the tract of the wheel; but when the tiller V is shoved to the right, (the person who shoves it standing between

between the handles) the leaves on the left of the cops will be drawn back at top, consequently the axle-tree of the wheel Q will be pushed forward at that end, which twists the plough from land; just the contrary will be the effect when the tiller V is shoved to the left.

“ The perforated pieces at the ends of the caps T, T, and stand R, are to regulate the height of the wheel to the thickness of the furrow, if there are not wheels to suit the different depths that the plough may be required to cut; and as wheels for that purpose are but little cost, and not above three would be wanted to answer a great variety of depths, I would rather recommend using wheels than altering the stand R, &c. because it effects the line of traction: and besides, when wheels are kept to answer the different heights, the master or his bailiff, by giving out only such wheels as answer to the depth the season requires, may depend upon having the land ploughed agreeable to his own mind unalterably. The pin, as seen at the top of the stand R, Fig. 1, is to prevent the stand from falling out of the mortise, when the plough is weighed up by the handles, to turn upon the friction wheels at the ends of the ridges, &c. The other pin sustains the pressure of the beam when the plough is in work.”

C H A P. XII.

*A Description and Explanation of Mr. LLOYD'S HORSE-HOE
and HARROWS.*

FIG. 1. *A perspective View of the HOE, with its HARROW.*

A, **T**HE Share, or Hoe, whose out-line forms an angle of 17 degrees; its legs are two feet ten inches and three quarters long, and two inches and three quarters broad at the tail end; their inner edges are one inch thick; their outer edges are steel properly hardened, and ground thin, so as to cut the roots of the weeds as the Hoe passes under the mould; the under surface of the Hoe is a little concave; the convexity of the upper surface of each leg is equal to a segment of one-sixth part of a circle, whose radius is one inch and five-eighths.

B, B, Two Iron Standards, eleven inches and three quarters long, (from shoulder to shoulder) two inches broad, and one inch thick, inclining to the horizon twenty degrees; their under ends are inserted into the share, and their upper ends pass through a cross beam, or transom, to which they are fastened with iron wedges and washers.

D, D,

C, An Iron Sheat, or Brace, one foot three inches and three quarters long, three inches broad, and one inch and a quarter thick, inclining to the horizon twenty degrees ; the under end of this Sheat is rivetted to the share ; its upper end passes through the beam, and is fastened thereto with an iron wedge and washer.

D, D, Two Pieces of Plate Iron, (See fig. 2.) one foot nine inches and an half long, from their under edges, five inches and a quarter broad, and about one-twelfth of an inch thick ; their fore ends are cut off slanting, and rivetted together, diverging towards their back ends, which are fastened with two iron pins to the two standards B, B, and serve occasionally as a double mould-board to heel or earth up the drills on each side of the intervals ; but when the hoe is first drawn through the intervals, these iron wings are taken off, and the angular share or hoe, cuts off the weeds at a proper depth, leaving them on the surface of the ground, where they remain till they are sufficiently withered to prevent them from vegetating ; the second going through the intervals, the iron wings are put on, and are used to earth up the drills, as before mentioned.

E, A Harrow, with seven tines, seven inches and an half long, from their shoulders to their points, and two inches and a quarter distant from each other ; the frame of the Harrow is one foot four inches and a quarter square, and its shaft (which is fastened to the sheat with an iron center pin and feathered bolt) is four feet long, including the Harrow frame ; this Harrow is used only when the hoe is drawn first through the intervals without the

the iron wings, and serves to pulverize the mould, and at the same time loosen and eradicate the weeds therefrom.

F, A round-headed Iron Pin, and feathered Bolt, with which the harrow is fastened to the sheat C.

G, An Iron Hook, or Brace, which serves to strengthen and support the beams and sheat.

H, A round-headed Iron Pin and Wedges, with which the hook is fastened to the beam.

I, A Gage Wheel, one foot four inches diameter, and two inches three quarters broad on the periphery.

K, The Iron Gage-Frame, whose arms are one foot two inches, and its shank two feet four inches and three quarters long, three inches broad, and one inch thick ; the shank of this frame is perforated with small holes, and passing through the beam is fastened thereto with a round-headed iron pin, and feathered bolt ; this Gage serves to regulate the depth of the share or hoe in the ground, by moving the iron pin L from one hole in the shank to another.

L, An Iron Pin, and feathered Bolt, with which the gage is fastened to the beam.

M, A round-headed Pin, and Feathered Bolt, which serves as an axis for the gage-wheel to turn on.

N, An Iron Wedge, with which the shank of the gage-frame is fastened to the beam, and by taking it out, the shank is easily moved from one hole to another.

O, An Iron Bridle, fastened to the beam with a round-headed bolt and wedge.

P, The Chain of the Whipple-Tree.

Q, The

Q, The Beam of the Hoe, is seven feet three inches long, from its fore end to the shoulder of its tenon, and four inches square at the tail end, tapering off towards the point or fore end, which is two inches and three quarters on all sides.

R, R, The Handles of the Hoe, whose extreme length are four feet seven inches and three quarters, and one foot two inches distant from each other at their points, or upper ends, and are fastened together with a wooden trundle; the Handles are fastened also to the beam and wooden standards, with wooden trundles.

S, S, Two Wooden Standards, mortised into the cross beam, or transom T.

T, The cross Beam, or Transom, is one foot six inches and three quarters long, and three inches and three quarters square; the under end of the beam is mortised into the Transom, to which the four standards are also inserted as before-mentioned.

*A Description and Explanation of Mr. LLOYD'S HARROW,
for stiff Clay Land.*

FIG. 3. *A perspective View of the HARROW.*

A, A, A, A, Four curved Shafts, or Ribs, two feet ten inches long, and one inch and three quarters square; each Rib is furnished with six flat tines, fixed six inches distant from each other.

L

B, B, B,

B, B, B, Three Rails, or Staves, inferted into the curved shafts, or ribs, and fastened thereto with wooden trundles ; the length of the fore Rail is two feet five inches and a quarter, and the hind Rail is two feet seven inches ; their breadths are one inch and three quarters, and three quarters of an inch thick.

C, The Bridle and Whipple-Tree, are fastened with an Iron Bolt to the fore end of the outermost shaft at the left side of the harrow, which is drawn with its shafts moving forwards in an oblique direction.

D, The furthestmost Tine, is fixed in a right line with the bolt of the bridle C, and all the other tines are fixed in such a direction as to make parallel lines to the Tine D.

F I G U R E IV.

A View of one of the FLAT TINES.

A, The Tine.

B, The Shank of the Tine, with a mortise through its upper end.

C, An Iron Wedge, or Key, which serves to fasten the tine to the shaft of the harrow.

N. B. It has been found by experience, that a harrow of this construction can be drawn with less force than any common harrow of the same dimensions, weight, number of lines, &c. and that it does more effectually cut and pulverize large lumps of stiff clay, than any other harrow now in use.

A model

A model of this Hoe and Harrow was presented to the Society by *Richard Lloyd*, Esq; for which he had the thanks of the Society, *April 25, 1770.*

C H A P. XIII.

*A Description and Explanation of Mr. EDGILL'S MACHINE
for cutting Chaff.*

F I G U R E I.

A, **A** Steel Plate, or Knife, of a spiral form, enlarging its radius, which is two inches and three quarters at the axis, or spindle, to sixteen inches at its point, and about one quarter of an inch thick on the back edge.

B, A Block of Wood, formed nearly of the same shape as the knife; its thickness at the spindle is four inches, gradually diminishing towards the edge and point of the knife, which is fastened to the inside of the Block with flat-headed wood-screws, being first let in even with the surface of the wood, and the holes in the knife counter-sunk, so as to let in the heads of the screws even with its surface.

C, An Iron Spindle, or Axis, two feet two inches long, and seven-eighths of an inch in diameter; the knife and block of wood being

being fixed to this spindle, revolves with it when the machine is at work. To this spindle is fixed also the forcer, or spiral tooth S, and the short iron lifting-arm X.

D, A circular Fence-Board, two feet ten inches in diameter, with its concentric rim. See K, Fig. 2.

E, A Winch. See Fig. 2.

F, A Trough, wherein the straw or hay is laid to be cut; its length is four feet; the depth ten inches, and breadth ten inches and an half (inside measure.)

G, A Lead Weight. See Fig. 2.

H, A Feeder, or Block of Wood, ten inches long (exclusive of its handle) which projects ten inches over the side of the trough, five inches and a quarter broad, and one inch thick: in this block there are fixed five iron spikes, or taper tines, whose length from their points to the under side of the block is six inches, and three-eighths of an inch square at their upper ends or shoulders: when the straw is properly placed in the trough, this spiked feeder is carried back to the end of the trough, and forced with the hand into the straw, which is brought forward at every revolution of the winch E, (Fig. 2.) the length of one tooth of the rack Y; and when the rack is drawn forward, quite to the fore end of the trough, the spiked feeder is then to be lifted up, carried back, and forced into the straw, as before-mentioned.

I, An Iron Bolt, one foot five inches long, seven-eighths of an inch broad, and three-eighths of an inch thick. This bolt is fastened with screws to the front of the feeder, and projecting one inch over the side of the trough, is connected to the horizontal wooden shaft R, with a flat iron plate screwed to its upper edge,
and

and turned up at right angles to the said shaft ; at the upper end of this plate there is an aperture, or square hole, to receive and direct the iron bolt fastened to the front of the feeder.

K, A concentric Rim, fastened to the fence-board D, set forth in the explanation of Fig. 2.

L, A bended Iron, which sustains the lead weight, set forth more particularly in the explanation of Fig. 2.

M, The Handle of the feeder, which, as before-mentioned, serves to lift up, and carry back the feeder H, shaft I, and rack R, Y.

N, O, The ends of the concentric Rim K. See Fig. 2.

P, A Carriage Wheel, nineteen inches diameter, and two inches broad on its periphery.

Q, The Stand, or Frame of the Machine : the rails and legs are two inches and an half by one inch and seven-eighths ; their length from the ground to the bottom of the trough, is two feet seven inches.

R, An horizontal Sliding Shaft, made of wood, two feet seven inches long, one inch and an half broad, and one inch seven-eighths thick.

S, A Spiral Tooth, or Forcer, fixed to the spindle about three inches from its extremity : at the under end of this Spiral Tooth, or Forcer, there is a round hole, which, like a ferrel, is driven tight on the spindle, and fixed thereto with an iron pin passing through the ferrel and spindle ; the upper end of this Tooth, or Forcer, is a small segment of a circle, standing a little oblique to the spindle, and passing freely through the interstices of the askew teeth of the rack, forcing it forward the length of one tooth of the rack, at every revolution of the winch E.

T, A

T, A Wooden Lever, one foot long, two inches and an half broad, and two inches thick, fastened to the rail of the fence-board D, with an iron pin, key, and washer; on the under edge of this Lever, (about two inches and three quarters from the inner end) there is a thin plate of iron to prevent the short arm X from wearing the under edge of the Lever.

V, A Rail, or Cross Brace, one foot seven inches long, three quarters of an inch thick, and five inches broad, fastened to the fence-board.

W, W, Two Poles, with which the machine is conveyed from one place to another.

X, A short Iron Arm, or Riser, two inches and an half long, half an inch broad, and a quarter of an inch thick; this Arm is fastened to the spindle in the same manner as the forcer, or spiral tooth S.

Y, An Iron Rack, fastened with screws to the under edge of the sliding shaft; this Rack is nine inches long, two broad, and one quarter of an inch thick, with thirty-three oblique teeth on its outside edge.

Z, An Iron Plate, fastened to the wooden cleat on the side of the trough: the spindle C passes through and turns in this Plate, and is fastened thereto with an iron key and washer.

F I G U R E II.

A, A Steel Plate, or Knife, of a spiral form, set forth more particularly in the explanation of Fig. 1.

B, A

B, A Block of Wood, formed nearly of the same shape as the knife. See the explanation, Fig. 1.

C, An Iron Spindle, or Axis, two feet two inches long, and seven-eighths in diameter. See Fig. 1.

D, A circular Fence-board, referred to Fig. 1.

E, A Winch, with which the machine is worked; its radius is twelve inches and an half.

F, A Trough, wherein the chaff is laid to be cut. See Fig. 1.

G, A Lead Weight, nine inches and an half long, three inches and an half broad, and two inches and an half thick, weighing about thirty-eight pounds, having in the middle of its upper surface an iron staple, by which it is suspended to the curved iron L; and at each end of this weight there is an iron pin, about an inch long, and half an inch diameter. Those pins traverse up and down in an aperture cut in each side of the trough, and serves to keep the weight in a proper direction, as it rises and falls on the straw, which by this weight is pressed close together whilst the knife is cutting it.

H, The Feeder. See the description, Fig. 1.

I, A perpendicular Sliding Bolt, screwed to the feeder, set forth in the explanation of it, Fig. 1.

K, A concentric Rim, two inches broad, fastened to the fore side of the circular fence-board, and continued from N to O; this Rim forms a groove which guards the point of the knife, so as to prevent it from hurting the person who works the machine.

L, A bended Iron, fifteen inches and three quarters long, flatted at one end, and fastened with four wood-screws to the wooden

wooden lever behind the fence-board ; and at its end there is a hook which sustains the lead weight.

M, The Handle of the Feeder H. See the Description of it, Fig. 1.

N, O, The Ends of the concentric Rim, fastened to the fence-board.

P, The Carriage Wheel, described in Fig. 1.

Q, The Stand, or Frame of the Machine. See the Explanation, Fig. 1.

W, W, Two Poles, with which the machine is conveyed from one place to another.

The Committee of Mechanics took into consideration Mr. *Edgill's* Machine for cutting Chaff;—Resolved, that the Machine appears to be of a very simple and useful construction, that the application of its spiral cutter seems to be new; and that it is the opinion of the Committee that the inventor is deserving of a bounty of twenty guineas; to which resolution the Society agreed, *May 11, 1768.*

C H A P. XIV.

*A Description and Explanation of Mr. EDGILL'S MACHINE
for slicing Turnips, &c. To which are added, some Improve-
ments by Mr. WILLIAM BAILEY.*

PLATE I. FIG. 1. *A perspective View of the MACHINE.*

PLATE 2. FIG. 2. *A perspective View of the STAND, and internal
Part of the MACHINE.*

A, **T**HE Pedestal, or Stand, with its kirb, moveable
bottom, knives, center-plate, ring, spindle, &c.

B, B, Two Ground-Sills, halved together in the middle;
their extreme length is four feet seven inches; their breadth two
inches and a quarter, and thickness two inches: at the extremity
of each of these Sills there is an aperture, with an iron screw,
which serves to fix the pedestal to the floor.

C, C, C, C, Four short Sills, (of the same breadth and thick-
ness as the ground-sills B, B) mortised into the short braces
D, D, D, D, which form a square in the middle of the stand.

M

D, D, D, D,

D, D, D, D, Four short Braces, mortised into the principal fills B, B, &c. their length, exclusive of their tenons, is one foot six inches.

E, E, E, E, E, E, E, E, Eight short Posts, seventeen inches long, exclusive of their tenons, and of the same breadth and thickness as the ground-fills on which they are erected.

F, F, Two cross Braces, halved together in the middle, and mortised into the four posts erected on the principal fills, distant from their upper sides nine inches and a quarter.

G, A circular Kirb, or Rim, three inches and an half broad, one inch and a quarter thick, and three feet ten inches diameter (from out to out); this Kirb, or Rim, is fastened to the upper ends of the eight posts with strong iron wood-screws, whose heads are let in even with the surface of the Kirb.

H, H, H, H, H, H, H, H, Eight Brass Friction Rollers, one inch and a quarter in diameter, and one inch and an half on its periphery: these Rollers are let into the kirb projecting five tenths of an inch above its upper surface.

I, I, I, I, Four Scales of Inches, and Parts of Inches, with a hand to each of them to direct how to set the machine to slice the turnips, &c. of any thickness, from two inches to one eighth of an inch.—N. B. The Scales or Indexes are fixed to the kirb, and the hands to the moveable bottom P.

K, K, K, K, Four square flat-headed Screws, five inches and an half long, and one half of an inch thick: these Screws pass through the kirb and moveable bottom of the conic vessel; the heads of the Screws are let in even with the upper side of the kirb, and their winged nuts below sustain the moveable bottom, and serve
to

to elevate or depress it; by which means the turnips, &c. are sliced to any degree of thickness marked on the scales.

L, L, L, L, L, L, L, L, Eight Knives, twenty inches long, and two inches broad; their back edges are three-eighths of an inch thick; their outer ends are let into the kirb, even with its upper surface, and fastened thereto with strong flat-headed wood-screws, between the iron plate M, and the flat iron ring N; the plate M being first fastened with screws to its supporter Z. See Fig. 2, and Fig. 4. The knives are set in an oblique direction to the central point of the spindle; their inner ends being one inch and one-eighth therefrom, and their outer ends at right angles with the spindles.—N. B. The under side of the knives are bevelled off like a carpenter's chissel, but their upper sides are plain, smooth, and truly horizontal.

M, A round Plate of Iron, ten inches in diameter, and one quarter of an inch thick, with a round hole in its center for the spindle to pass through; this plate is fastened with iron screws to its supporter Z, as before-mentioned.

N, A Flat Iron Ring, ten inches in diameter, and one inch and three quarters broad; this plate is pierced with eight holes, which match with the screw holes in the plate M, and the holes in the ends of the knives, between which flat Ring and plate the knives are fastened with screws, as before-mentioned.

O, An Iron Spindle, three feet four inches long; its upper end is round, from the top down to the plate Z, and from thence to the bottom; it is one inch and a quarter square; to which square part is welded four cross arms, pierced with holes for wood-screws to fasten the spindle to the ground-fills, the under end of the
Spindle

Spindle passing through the center of them. See Fig. 4, Plate 3. There are also four other cross arms welded to the Spindle, and fastened with wood-screws to the upper sides of the middle stays F, F. See Fig. 4.

P, The moveable Bottom, is three feet ten inches in diameter, and two inches and a quarter thick: this Bed, or Bottom, is sustained by four winged nuts, K, K, K, K, under the kirb G. By these winged nuts and screws the moveable Bottom may be so elevated or depressed, as to slice the turnips, carrots, &c. of any thickness, from two inches to one-eighth of an inch. In this moveable Bottom there are eight apertures for the sliced turnips to pass through; these apertures are not cut down perpendicularly, but slanting from the cutting edges of the knives, in order to preserve as much as possible the substance of the wood, and to make way for the slices to pass through freely. The apertures are fifteen inches long, measuring from the inside of the vessel to the outer edge of the iron ring M: their breadths at their outer ends are two inches and three quarters, tapering as they approach towards the said ring, where they are only one inch and an half broad. The fore edges of the apertures are parallel with the cutting edges of the knives, extending one eighth of an inch before them.

Q, Q, Two feathered Bolts, or Keys; these Bolts pass through the apertures in the spindle O; their under edges bearing on two iron rings or washers, to prevent the vessel from rising from the friction rollers.

F I G.

F I G U R E III.

R, A conic Vessel, three feet four inches and an half in diameter at the bottom, and three feet two inches inside measure at the top ; its depth is one foot four inches and three quarters ; the thickness of the staves one inch and one eighth.

S, A square Block of Wood, six by six inches on all sides : this block is fixed in the center of the vessel with four cross braces or drivers T, T, T, T. The under side of the block is plated with iron, in which there is a hole truly central to the circumference of the vessel, which the iron spindle passes through ; this hole and the vessel with its drivers and block revolve round it.

T, T, T, T, Four cross Braces, or Drivers, eighteen inches and an half long, five inches and a quarter broad, and one inch thick ; these Drivers are fastened to the vessel and block in an oblique direction, inclining to the horizon forty degrees ; the outer ends of the Drivers are fitted obliquely into four notches, cut up about an inch and a quarter from the under edge of the vessel, to which the Drivers are fixed with strong wood-screws : their inner ends are inserted obliquely into the square block S, to which they are fastened with nails, or wood-screws.

V, A Cross Brace, dovetailed into the vessel, with its upper surface three-eighths of an inch below the brim of the vessel ; this Brace is six inches broad in the middle, and four inches and an half at the ends ; its thickness is one inch and a quarter, having an iron plate fastened to its upper end side, with a hole for the spindle to pass through.

W, W,

W, W, Two horizontal Levers: their inner ends are fastened with hinges screwed to the cross brace V, distant six inches from the fixed spindle, their outer ends projecting three feet over the brim of the vessel.

X, X, Two strong Screws, with flat semicircular heads, which serve occasionally to fasten the levers to the brace, or to loosen them therefrom when the levers are to be lifted up out of the way, when the machine is not immediately in use: this is done by turning the heads of the Screws across the apertures, when they are to be fastened to the brace; and parallel with the aperture when they are to be taken up.

Y, Y, Y, Y, Four Wood-Screws, or Hooks, six inches long, and half an inch thick; their use is to fasten the machine to the floor, in the same manner as the two levers W, W, are fastened to the cross brace V.

Z, A circular Piece of Iron, three inches in diameter, welded to the fixed spindle O; this circular Iron supports the plate M, to which it is fastened with four iron screws. See Fig. 2 and 4.

This Machine was invented by Mr. *Edgill*, for which he obtained a premium of 20*l.* December 10, 1766.

There are some improvements made to it by Mr. *William Bailey*, for which the Society gave him a bounty of ten guineas, March 11, 1767.

N. B. Two men can work this Machine with so much ease and facility as to slice twelve bushels of turnips in five minutes; which operation it did perform in presence of the Committee of Agriculture, at the time above-mentioned.

C H A P. XV.

A Description and Explanation of Mr. RUTT's APPARATUS for drying Madder. To which is annexed his Observations on the Management of it, from the taking it out of the Ground to its being manufactured.

FIG. I. *A perspective View of the APPARATUS.*

A, **A** Wooden Stage, or Floor, on which are a sufficient number of hurdles, two or three abreast.

B, A Tilt, which is occasionally drawn over the madder to keep it dry.

C, C, C, C, C, C, C, C, A Rank of Grooves, cut across the upper surface of the floor; these Grooves serve to regulate the intervals between the hurdles, and prevent their feet or under ends from sliding from their places.

D, D, Two Slips of Wood, fastened to the floor to prevent the hurdles from sliding off the side of the stage, and to regulate the placing them in proper order.

E, E, E, E, E, E, E, E, A Set of Hurdles, put two or three abreast, with their feet or under ends placed into the grooves in the stage: these Hurdles may be set to any degree of elevation by altering the length of the triggers or props of the Hurdles.

F, F, &c.

F, F, F, F, F, F, F, F, The Triggers, are short pieces of wood fitted into the apertures in the heads of the hurdles; the upper ends of the Triggers turn on pins, with which they are fastened to the hurdle, and are occasionally, for the conveniency of stowing away, turned up when the hurdles are not immediately in use, and down when the apparatus is put to work.

The following observations relative to Madder, together with a very ingenious model of an Apparatus for drying it, was presented to the Society by the Author, Mr. *George Rutt*; for which he had the thanks of the Society, *May 11, 1763.*

“ 1st, The proper season for taking the roots out of the ground has been usually thought to be in *September*, and the two following months; but if left till *February*, it is as well for the roots, and far more convenient, for the weather to wind-dry them, which is supposed to be the best method, as *February* and *March* have generally more wind and less fogs than the winter months.

“ 2d, As drying the fresh roots by fire is expensive, trials have been made of doing it by the air, or wind, which have succeeded very well: to effect this, a method should be taken to place the roots on hurdles (or some other convenience) ranged obliquely one behind another in rows, in such a position that a current of air might constantly blow end-ways through the spaces between the hurdles, which should be covered, so as to prevent the rain coming upon the madder; and the oftener it is turned, the sooner it dries, as some dirt comes from it every time it is
turned;

turned; and it also prevents its growing mouldy, which is a great detriment when it so happens: but if any person chuses to do it by fire, it should be done with a very gentle heat, and turned often, and should also be partly dried by the air (as above) before it is put on the kiln.

“ 3d, When it is so dry that the largest pieces of the root will break short, it should be threshed, and thereby broke into bits about an inch or two in length, and afterwards thrown over a coarse corn-screen, or sifted with a wire sieve, of about six meshes to an inch; what does not pass through this sieve is to be fanned over, to take out the bits of haum, and outside coat, which breaks off in threshing; and the small, which passes through the above sieve, is to be sifted over a fine wire sieve, to take out the dust; and what stays in the last sieve, together with the light bits that are fanned out, are to be put together, and kept separate from the rest; the whole may be packed up light in casks (if they can be procured cheap, and their weight will not add much to the carriage); or close corn sacks; it is then ready to be sent to the Machine to be manufactured.

C H A P. XVI.

*A Description and Explanation of Mr. EVERS'S WINNOWING
MACHINE.*

P L A T E I. F I G U R E I.

A, **T**HE Axis of the Fly, is one foot ten inches long, and three-eighths of an inch diameter ; on its outer end there is an iron pinion ; and at the other end there is a crank, whose radius is one inch.

B, B, B, B, B, The Fans of the Fly, (indicated by the dotted lines on the side of the cap) are sixteen inches long, twenty inches broad, and three-eighths of an inch thick : these Fans are fastened to the axis of the Fly A. See Plate 2. Fig. 3.

C, An Iron Pinion, three inches and a quarter in diameter, with twelve teeth on its periphery, which is one inch broad ; its iron axis turns in two iron plates fastened to the sides of the posts S, S.

D, An Iron Spur-Wheel, thirteen inches and three quarters in diameter, with sixty teeth ; the breadth of its rim is three quarters of an inch, and its thickness five-eighths of an inch.

E, A Winch, whose radius is twelve inches.

F, A Hopper, whose end is two feet two inches square (inside measure) ; its under end is thirteen inches and an half, by four and
an

an half; its perpendicular height is one foot one inch and an half.

G, A Wooden Handle, fastened to a sliding valve; its use is to regulate the discharge of corn, by dilating or contracting the aperture at the bottom of the hopper.

H, An Iron Fork, with four prongs; its handle or shank bears on the bended iron or fulcrum I, to which it is connected, and so loosely rivetted as to move alternately from side to side: at the extremity of the shank there is another iron pin, or screw, which serves to confine the shank to the wooden trundle Y, which is put in motion by the cranks and crank-rods P, P. See Fig. 3, 4.

I, The Fulcrum, or bended Iron (with a round hole in each end of it); its extreme length is one foot eleven inches; breadth, half an inch; and thickness, one quarter of an inch. This iron projects over the sides of the case of the machine; to which it is connected with two round iron pins, whose under ends are flatted and screwed to the external sides of the case. See Plate 1, Fig. 1 and 4.

K, A Wooden Roller, which turns in the two front posts S, S, and is connected to the riddle-box with two small chains, which serve to set the riddle to a proper degree of inclination for conveying the corn to the under screen or riddle: at the end of this roller there is a wooden ratchet-wheel and spring, to fix it when the moveable riddle is properly set.

L, A round-headed Iron Pin, which passes through the bottom of the hopper to sustain the upper riddle-box, and is the center of its alternate motion. See Fig. 4, Plate 2.

M, The

M, The upper Riddle-Box, is one foot seven inches and an half long, one foot six inches and an half broad, and eight inches deep (outside measure); this box, with its riddle, fork, fulcrum, &c. are actuated by the fly and crank, as before-mentioned.

N, A fixed Riddle, or Screen, two feet six inches long, three feet nine inches and three-eighths broad. See N, Fig. 2.

O, The under moveable Riddle, two feet six inches long, and one foot seven inches broad, actuated by the crank and rod P. See Fig. 3, Plate 2.

P, P, Two Iron Rods; one of them is three feet; the other, two feet two inches long, and three-eighths of an inch square: these Rods are actuated by the crank at the inner end of the axis of the fly A: the upper Rod gives motion to the riddle-box M, and the under Rod to the moveable riddle O, as before-mentioned. See Plate 2, Fig. 3.

Q, A Roller, with two small chains, and a wooden ratchet-wheel at its inner end, with which the under moveable riddle is set to a proper degree of inclination.—N. B. A spring, made of a thin piece of wood, bears against the periphery of this and the ratchet-wheel of the upper roller, to fix them in their places.

R, R, R, R, The Handles of the Machine, with which it is taken up and conveyed from one place to another.

S, S, S, S, Four Posts, or Standards, to which the case of the machine is fastened: these Posts are four feet eleven inches long, by two inches and an half square.

T, A sliding Fence-board, two feet two inches long, one foot nine inches and three quarters broad, and three-eighths of an inch thick; to which is fastened a piece of wood sixteen inches long,

long, and three quarters of an inch square, with sixteen notches, cut like the teeth of a saw or ratchet-wheel.

V, A Wooden Hasp, or Button, fastened to one of the front rails of the machine, with a round-headed iron pin; the end of this Hasp sustains the sliding fence-board, and serves occasionally to set it of a proper height, to retain the grain in the upper riddle-box for a time sufficient to cleanse it from its husks, &c.

W, W, A Profile of the Sides of the two under Riddles. See Fig. 2.

X, A round-headed Iron Pin, which sustains the under riddle, and permits it to move alternately from side to side. See X, Fig. 3.

Y, A Wooden Trundle, fastened to the sides of the riddle-box M: to which Trundle the shank of the fork is loosely fixed with a round-headed iron pin, as before-mentioned. See Fig. 3, 4.

F I G U R E II.

A Geometrical Plan of the two under Riddles.

W, W, A Geometrical Elevation of the Sides of the Riddles.

X, An Iron Pin, with a round head at its upper end, and a mortise or hole to receive a feathered bolt in its under end, with which the riddle O is connected to riddle N.

F I G U R E III.

A, A Wooden Axis, to which the fans of the fly are fastened.

B, B, &c.

B, B, B, B, B, The Fans of the Fly. See the description, Fig. 1.

C, An Iron Pinion. See the description, Fig. 1.

D, An Iron Spur-Wheel. See Fig. 1.

E, The Winch.

F, The Hopper.

G, The Handle of the slide Valve.

K, A Wooden Roller, with its ratchet-wheel and chains, to which the riddle-box is suspended : this Roller is twenty-three inches and a quarter long, and one inch in diameter ; the ratchet-wheel is three inches and a quarter in diameter, and one inch on its periphery : this ratchet-wheel is let into the side of the post, even with its surface.

M, The upper Riddle-Box.

N, The fixed Riddle.

O, The under Riddle : these Riddles are indicated by the dotted lines on the side of the case, Fig. 1.

P, P, The Crank Rods.

O, The Roller and Ratchet-Wheel, &c. of the under Riddle : this Roller, &c. is of the same dimensions as the roller K.

R, R, The Handles of the Machine.

S, S, S, S, The four Posts, or Frame of the Machine.

X, The Iron Center-Pin which sustains the under riddle.

F I G U R E IV.

- F, The Hopper.
H, The Fork.
I, The Fulcrum, or bended Iron.
K, The upper Roller, with its ratchet-wheel and chains.
L, The round-headed Iron, to which the riddles, riddle-box, &c. are suspended.
M, The Riddle-Box.
Y, The Trundle; fet forth more particularly in the description of Plate I.

This Machine was purchafed of Mr. *Evers*, *January* 14, 1761.

C H A P. XVII.

A Description of the Model of Mr. EVERS'S WIND-MILL for threshing and grinding Corn; made to a Scale of an Inch and an half to a Foot.

PLATE I, FIG. I. *A Geometrical Plan of the MILL.*

A, **T**HE Ground Floor, is two feet square, inside measure, and one foot nine inches and three quarters high.

B, B, &c.

B, B, B, B, B, B, B, B, Eight short Posts or Blocks of Wood, three inches and three quarters long, and one inch and a quarter broad, and half an inch thick. These Posts are fastened to the ground-floor, to support the moveable threshing-floor, which turns very slowly on friction rollers inserted into the heads of the Posts.

C, A circular Threshing-Floor, two feet in diameter, and one inch and seven-eighths broad, on its periphery, in which there are one hundred and forty-eight cogs: the corn is laid on this Floor with its straw, or stalks, in a concentric direction, and threshed with the perpendicular stampers L.

D, The perpendicular Axis of the Threshing-Floor, supported on a column, whose height from its plinth to the top of its capital, is ten inches and three-eighths. Its under gudgeon works in a block of wood fastened on the ground-floor; and its upper gudgeon turns in the beam or girder which sustains the mill-stones O, &c.

E, An Iron Pinion, one inch and an half in diameter, with six teeth. This Pinion turns the large spur-wheel or threshing-floor C.

F, A Spur-Wheel, two inches and five-eighths in diameter, with fourteen teeth connected to the spur-wheel G.

G, A Spur-Wheel, one inch and seven-eighths in diameter, with eight cogs.

H, A Crown-Wheel, three inches and one-fourth in diameter, with eighteen cogs, actuated by the spur-wheel I.

I, A Spur-Wheel, three inches and three quarters in diameter, with nineteen cogs; this Wheel is fastened to the outer end of the barrel, and revolves with it.

K, A

K, A hollow Wooden Cylinder, eight inches and three-eighths in diameter, and eight inches broad, on its periphery, on which there are fixed a set of studs or friction-rollers in a spiral direction, equidistant from each other. These studs or lifting rollers being thus disposed, they lift up the stampers, or flails L, in successive order as the Cylinder revolves.

L, Twelve Stampers, or Flails, fourteen inches long, and one-third of an inch square, set equidistant from each other, and properly fitted to embrace the friction-rollers on the cylinder, as they pass in rotation; for which purpose there are mortises or notches cut in the rails f, f, in which the stampers move loosely up and down, when they are actuated by the studs or friction-rollers. The feet of the stampers are two feet broad, straight on their bearings or under ends, and curved on the upper part of the feet, as represented in Fig. 2. where is seen also, an iron socket or shoe, fastened to the stamper, and properly fitted to lay hold of the friction-roller on the cylinder.

M, A vertical Crown-Wheel, fastened to the inner end of the cylinder: this Wheel is nine inches in diameter, with fifty cogs, connected to the horizontal crown-wheel N.

N, An horizontal Crown-Wheel, four inches and an half in diameter, with twenty cogs: this Wheel is fastened to the main shaft Z, and gives motion to the cylinder, and the whole train connected thereto.

O, A Pair of Stones for grinding Corn, eight inches and three quarters in diameter, and two inches and one eighth thick, each stone.

O

P, A.

P, A Lantern-Wheel, two inches and an half in diameter, with twenty-one trundles.

Q, An horizontal Spur-Wheel, ten inches in diameter, with fixty cogs: this wheel gives motion to the mill-stones O, and lantern-wheel P, on the same spindle.

R, A Crown-Wheel, seven inches and an half in diameter, with forty cogs.

S, A Crown-Wheel, eight inches and an half in diameter, with forty cogs: this Wheel is fastened to the wind-shaft, the first mover of the train.

T, T, T, T, The Vanes, or Sails, two feet five inches and an half long, and one foot broad, fastened to the wind-shaft in the usual manner.

U, A large Wooden Weather-cock, which serves to turn the sails to the wind.

V, The Collar-Beam, or Plat Form of the Roof, twenty-two inches, by seventeen, in diameter.

W, The Friction-Roller Frame, seventeen inches and a quarter in diameter, and half an inch thick.

X, X, &c. The Friction-Rollers, three quarters of an inch in diameter at their outer ends.

Y, The Hypotenuse, or fixed Collar-Beam, seventeen inches and three quarters diameter, and one inch and an half thick.

Z, The main Shaft, two feet nine inches and three quarters long, two inches and an half in diameter at the bottom, and one inch and an half at its upper end.

a, a, a, a, a, a, a, a, Eight Posts, framed together in the form of an octagon spire, whose height, from its platform to its fixed collar-beam, is two feet three inches and an half.

b, b, The Gallery, which goes round the spiral part of the mill.

c, c, &c. The Studs, or Rollers, three quarters of an inch in diameter, and five-eighths of an inch broad on the periphery.

d, d, &c. Iron Shoes, or Sockets, fastened to the stampers: their toes projecting three quarters of an inch therefrom, embrace the studs on the cylinder, and are by them lifted up as before-mentioned.

e, e, e, e, e, e, e, e, e, e, e, e, Twelve Tillers, or short pieces of Wood, which are made use of to fix and regulate the springs.

f, f, Two directing Rails. On the side of each of these Rails there is fastened a piece of wood, with notches, or mortises, in which the stampers are inserted and move loosely up and down, when actuated by the studs on the cylinder.

g, A Rail, notched in the same manner as the rails which guide the stampers. This Rail contains the tillers e, e, &c. and serves to set and regulate the ends of the springs of a proper height, to keep the stampers from bearing on the straw.

h, A Rail, in which the ends of the springs are fastened.

i, A thin Plate of Iron, fastened to the rail h, and pierced through with holes for the ends of the springs k, k, which in the model are made of steel wire, or comb-broaches; but in the machine itself they are made of fir, ash, or any other straight wooden poles.

k, A Set of Springs, made of steel wire, or woolcombers broaches; their points pass through the apertures in the stampers. See Fig. 3.

l, The

l, The Wind-Shaft, is seventeen inches long, an inch and one-eighth in diameter, at the outer end, and three quarters of an inch at the inner end, and set to an angle of twelve degrees.

F I G U R E II.

A side View of one of the STAMPERS, with its Iron Shoe.

d, The Iron Shoe, or Socket, fastened to the shank of the stamper L.

F I G U R E III.

A view of the edge of the stamper L, in which is seen part of the shoe d, and the aperture k, in which the points of the steel wires pass through.

P L A T E II. F I G. IV.

A, The Ground-Floor.

B, The Blocks and Friction-Rollers, on which the threshing floor revolves.

C, The Threshing-Floor, with its spur-wheel.

D, The Column, or Shaft of the Threshing-Floor; this column is not seen in this view of the mill. See Fig. I.

E, The Spur-Wheel, which gives motion to the spur-wheel C.

F, A Spur-Wheel, on the same spindle as the wheel E.

G, The

- G, The Spur-Wheel, which gives motion to the wheel F.
H, A Crown-Wheel, on the same spindle as the wheel G.
I, A Spur-Wheel, fastened to the axis of the hollow cylinder.
K, The hollow Cylinder, with its studs or friction-rollers, &c.
L, The Stampers.
M, A vertical Crown-Wheel.
N, An horizontal Crown-Wheel.
k, The Steel Springs, or Comb broaches. These Springs in their full magnitude are made of fir, or ash poles.
b, b, The Galleries, which go round the mill.
P, A Lantern-Wheel, not seen in this view of the mill.
Q, The horizontal Spur-Wheel, which gives motion to the mill-stones.
R, A Crown-Wheel, actuated by the crown-wheel S.
S, A Crown-Wheel, fastened to the wind-shaft.
T, The Whips, or Arms of the Vanes.
V, The Collar-Beam.
U, The Weather-cock.
W, The Friction-Roller Frame.
X, X, &c. The Friction-Rollers.
Y, The fixed Collar-Beam.
Z, The Main Shaft.

F I G U R E V.

- W, A Plan of the Friction-Roller and Frame.
X, X, &c. A Set of Friction-Rollers.

P L A T E

P L A T E I I I . F I G . V I .

A Plan of the GROUND-FLOOR, THRESHING-FLOOR, CYLINDER, &c.

- A, The Framing of the Ground-Floor.
- C, The Threshing-Floor.
- H, A Crown-Wheel, on the same spindle as the wheel G.
- I, A Spur-Wheel, fastened to the axis of the hollow-cylinder.
- K, The hollow Cylinder, with its studs c, c, &c.
- O, The Mill-Stones.
- P, A Lantern-Wheel, on the same spindle as the mill-stones.
- Q, The Spur-Wheel, which gives motion to the lantern-wheel P.

F I G U R E V I I .

A perspective View of the GROUND-FLOOR, THRESHING-FLOOR,
and the Movements contained thereon.

- A, The Ground-Floor.
- B, B, &c. The Blocks, with their friction-rollers.
- C, The Threshing-Floor.

D, The

- D, The Shaft of the Threshing-Floor.
 E, The Lantern-Wheel, which gives motion to the spur-wheel on the threshing-floor.
 F, A Lantern-Wheel, on the same spindle as the wheel E.
 G, A Spur-Wheel, connected to the wheel F.
 H, A Crown-Wheel, on the same spindle as the wheel G.
 I, A Spur-Wheel, on the axis of the hollow cylinder.
 K, The hollow Cylinder, with its studs, or rollers c, c, &c.
 L, The Stampers.
 f, f, The Guide-Rails of the Stampers.
 d, d, &c. The Shoes of the Stampers.
 k, The Steel Springs, or, in the model, Fir-Poles at large.
 e, e, &c. The Tillers, which regulate the springs.
 g, The Rail, to which the tillers are fastened.
 h, The Rail, to which the springs are fastened.
 i, A thin Plate of Iron, nailed to the rail for the ends of the springs to pass through.

This Mill was invented by Mr. *William Evers*, of *Swillington*, near *Leeds*, in *Yorkshire*, who erected one of his new constructed Mills in its full magnitude, for Mr. *John Turton*, farmer, at *Wragby*, in the said county, where it worked in presence of many respectable gentlemen, farmers, and others, who signed a certificate of their approbation of the utility of the machine. A model of it, made to a scale of an inch and an half to a foot, was produced to the Society by Mr. *Evers*; for which he had a bounty of fifty pounds, and the further sum of ten guineas for his model, which was deposited in the Society's Repository of Agriculture, *February*, 3d, 1768.

C H A P.

C H A P. XVIII.

*A Description and Explanation of Mr. EDGEWORTH'S PERAMBULATOR.*FIG. I. *A Plan of the MACHINE.*

A, **T**HE Nave of the Perambulator, is made of two circular pieces of wood, eight inches in diameter, and one inch thick. On the side of one of them, there are eleven concentric grooves; the other has only a plain, smooth surface, which is laid over the grooves, and fastened thereto with three screws and nuts.

B, B, B, The Screws and Nuts, with which the grooved and the plain part of the nave are fastened together.

C, A square hole in the center of the nave, into which the axis G is inserted, and fastened with the screw and nut I.

D, D, D, D, D, D, D, D, D, D, D, Eleven Spokes, one inch square at their nave ends, which are driven tight into the grooves or mortises in the nave: the points of the Spokes are rounded off, about two inches from their extremities, and capped with brass, to prevent them from gulling or wearing: this stock of Spokes, or wheel without fellys, is exactly one pole in circumference, and may be easily rendered portable, by unscrewing the sides of the nave, &c.

E, A

E, A Line, or Cord, tied from one spoke to the other, to steady and regulate their distance from point to point.

F, F, F, F, F, F, F, F, F, F, F, F, Eleven Brafs Caps, fastened to the spokes, to prevent them from wearing, &c.

F I G U R E II.

A Profile of the MACHINE.

A, The Nave.

D, D, D, D, D, D, D, D, D, D, D, Eleven Spokes.

F, F, F, F, F, F, F, F, F, F, F, Eleven Brafs Caps, or Ferrils, fastened to the ends of the spokes.

G, A round Iron Axis, or Cylinder, circumscribed with a spiral line or thread, consisting of a certain number of circumvolutions on its surface. Its length (in its full magnitude) is two feet eight inches and a quarter, and seven-twelfths of an inch in diameter: its upper and under sides are filed off flat, so as to form a narrow fillet or margin, from one end of the axis to the other; on which is engraved an index, to shew the number of poles, furlongs, and miles, the perambulator has passed over: the index on one side of the axis shews the degrees from the right hand to the left: the degrees on the other side are marked and reckoned from the left to the right; and when the nut H has fully performed its retrograde motion, by passing from the nave to the extremity of the axis, and back again, the machine will have measured out exactly two miles: the axis is held, and turns round, in the hands of the person who uses it, whilst the wheel rolls on the ground.

As the number of revolutions which the wheel makes exactly

P

correspond

correspond with the spiral threads on the axis or screw-rod, the thicker those threads are, the larger and more conspicuous will be the degrees on the index.

H, A Brass Nut or female screw, two inches and an half long, one inch and a quarter broad, and three quarters of an inch thick; this nut hangs like a pendulum, on the axis or screw-rod G, but does not turn round with it, being kept in a perpendicular position, with its center of gravity below its center of suspension, gradually advancing or receding on the axis, and pointing to the index marked thereon; which index shews how many revolutions the wheel has made, and the number of miles, furlongs, poles, &c. it has passed over.

I, A Screw and Nut, with which the axis is fastened to the nave.

F I G U R E III.

A View of the Axis, with its Index, &c.

G, The Axis, or Screw-Rod.

H, The Brass Nut.

I, The Screw, with which the axis is fastened to the nave A.

This Perambulator was tried in the King's private road near *Pimlico*, in presence of the Committee of mechanics, who was of opinion, that it is cheap, simple, more portable and commodious in its uses, and accurate in its operations, than the common Perambulator.

The Committee recommended the silver medal of the Society to be given to *Richard Lovel Edgeworth*, Esq; for his ingenuity, and laying the same open to the public; to which the Society agreed *April 8, 1767.*

C H A P.

C H A P. XIX.

A Description and Explanation of Mr. CHRISTOPHER SAVERLAND'S MACHINE for levelling Land; taken from a Model made to a Scale of one Inch to a Foot.

FIG. I. *A perspective View of the MACHINE.*

A, **T**HE Thill, or Shafts of the Carriage, are eight feet two inches long.

B, B, The fore Carriage-Wheels, are three feet diameter.

C, The Axle-tree of the fore Carriage, is three feet eight inches long, one foot one inch broad, and five inches thick.

D, The Transom and Bed of the fore Carriage, is three feet seven inches long, seven inches broad, and five inches thick; fastened together with two iron bolts, and an iron sway-bar.

E, The Sway-bar Frame.

F, A curved Pole, five feet two inches long, eight inches broad, and six inches and an half thick, at its inner end, which is halved and dowelled to the fore rails G, Y.

G, The front Rail of the hind Carriage-Frame, is three feet five inches long, (from shoulder to shoulder) ten inches broad, and five inches thick.

H, H, Two Sills, nine feet three inches long, ten inches broad, and five inches thick; their fore ends are elevated, being
cut

cut up to an angle of thirty degrees, in order to bring the line of traction nearly parallel to the breast of the horse : these Sills are framed together with the three cross rails G, Y, Y.

I, I, I, I, Four Braces, two feet nine inches long, three inches and an half broad, and two inches thick ; these braces are mortised into the sills H, H, and fastened with wood-screws to the two posts K, K.

K, K, Two flat Posts, two feet eleven inches and an half long, from shoulder to shoulder, ten inches broad, and three inches and an half thick ; their under ends are mortised into the sills, five feet ten inches distant from their back ends ; and their upper ends into the transom or cross rail L. In the under ends of each of these Posts, there is an aperture or long mortise, to receive the short sliding-blocks V, V. See Fig. 1 and 4.

L, The Transom, or cross Rail, is four feet ten inches long, ten inches broad, and three inches thick ; this Rail projects about four inches over the posts, in order to be taken off and on the more readily, whenever the axis, arms, handles, &c. of the stoppers M, N, O, P, want to be repaired or altered.

M, M, The Arms of the Stoppers, are thirteen inches long, seven inches and three quarters broad, and two inches and an half thick. In the under edge of these Arms there are two angular teeth, or notches, like the teeth of a ratchet-wheel ; these teeth fall loosely into the square holes in the upper end of the shovel or pan Z, and occasionally stops it, when the workman presses down the handle O, P, &c.

N, The Wooden Axis of the Stopper, whose pivots turn in the upper ends of the flat posts H, H.

O, A

O, A round Rail, or Handle, with which the stoppers or notched arms are pressed down into the square holes in the upper end of the shovel Z.

P, P, Two Trundles, one foot five inches long, and one inch and an half in diameter, with which the under rail is connected to the handle, or upper rail O.

Q, The under Rail of the Stopper, is two feet eleven inches long, four inches broad, and three inches thick; this Rail, with the trundles and handles, are fastened to the Stopper or notched arms, as represented in Fig. 1, 3.

R, R, The hind Wheels, are one foot five inches in diameter, and three inches thick on their periphery.

S, The Plancere, or Floor, is three feet nine inches, by four feet three inches, on which the man stands to work the machine.

T, The Wooden Bar, which supports the shovel, is four feet three inches long, seven inches broad, and three inches thick; its tenons pass loosely through the long mortises in the sides of the fills, and are occasionally fixed with wooden wedges nearer or further from the shovel, to regulate its angle of inclination.

U, U, Two Iron Frames, or Quadrants, partly indicated by the dotted lines on the side of the fill; these quadrants are welded to the ends of the iron axis X, and fastened with wood-screws to the sides of the shovel Z, and may easily be set further or nearer to the point of the shovel, as shall be found most convenient to throw the weight of earth nearer or further the center of its motion.

V, V, Two Wooden Blocks, seven inches long, and four inches

inches square ; their ends are indented, and properly fitted to the pivots of the iron axis X, which they embrace in the manner represented in Fig. 1 and 3. The sides of these Blocks are rabbeted, and properly fitted to the apertures in the posts K, K, in which they move freely up and down, and are fixed to a proper height by the iron pins shewn at X, by which the shovel is set deeper or shallower into the ground, and easily moved on its axis in loading and unloading.

W, A Wooden Shovel, whose bottom is two feet five inches and an half square, inside measure, and about two inches thick ; its under end is shod with steel ; its upper end Z, is a piece of board, three feet long, thirteen inches broad, and two inches thick, fastened at right angles to the bottom, to which the angular sides are also fastened, as represented in Fig. 2.—N. B. This shovel contains about one garden-cart full of earth.

X, The Iron Axis of the Shovel, is three feet five inches long, from shoulder to shoulder, and one inch and an half square. The pivots of this axis turn in the two short blocks V, V, which are raised or depressed by shifting the iron pins, as before-mentioned.

Y, Y, Two Rails, three feet five inches long, (inside measure) eight inches broad, and four inches thick, mortised into the fills H, H.

Z, The upper End of the Shovel, is a piece of board three feet long, thirteen inches broad, and two inches thick, as before-mentioned ; at each end of this board, there are three square holes, to which the teeth or notches of the arms M, M, are loosely fitted, and occasionally inserted to keep the shovel in a proper position.

F I G.

F I G U R E II.

U, U, Two Iron Frames, or Quadrants, fastened to the iron axis, and the sides of the shovel.

X, The Iron Axis, to which the shovel is hung.

Z The upper End of the Shovel, in which there are square holes to receive the notches or teeth of the arms M, M.

F I G U R E III.

M, M, The notched Arms, or Stoppers.

N, The Wooden Axis of the Stoppers.

O, The hand Rail of the Stoppers.

P, P, Two Trundles, with which the handle, or upper and under rails are fastened together.

Q, The under Rail of the Handle-frame, halved and fastened to the notched arms M, M.

F I G U R E IV.

V, V, X, The Sliding Blocks, whose sides are rabbeted, and properly fitted to the apertures K, K, and their end to the pivots of the axis X.

A model

A model of this Machine was sent to the Society the twenty-second of *April*, 1771, and referred to the Committee of Agriculture and Mechanics jointly, who examined it with great accuracy ; but as the model is very small, (being made to a scale of one inch to a foot) they thought it adviseable not to give their opinion of it till they had seen the Machine in its full magnitude. Accordingly they appointed a time for the inspection of the Machine at *Watford*, in *Hertfordshire*, where a very respectable committee met, and minutely examined it ; had it worked in their presence, and with great facility it filled up a large pit in a ploughed field belonging to Lord *Hyde*, whose servants had successfully used it for some time past. This operation was performed to the satisfaction of the committee, who was of opinion, that the machine equals in work the labour of twenty men ; and that Mr. *Christopher Saverland* is deserving of the gold medal of the Society ; to which the Society agreed, *June* 5, 1771.

C H A P. XX.

A Description and Explanation of a Pyramidical BEE-HIVE, presented to the Society by Sir CHARLES WHITWORTH, one of the Society's worthy Vice Presidents.

FIG. I. *A perspective View of the HIVE, fixed to a Wooden Post, or Pillar, in the Ground.*

A, **A** Post, or Pillar, driven into the ground, of a depth sufficient to support and secure the hives from being shocked or overturned by stormy winds, &c. its upper end is about two feet from the ground, and properly shaped, to sustain a large square board, whereon the hives are placed.

B, A Piece of Board, about two feet square, and two inches thick; in the middle of this Board there is a square hole, or mortise, into which the head of the post A is inserted, and well fastened with wedges, nails, or wood-screws: by this method of fixing the floor, the bees are much better secured from mice, and other vermin, than when they are placed on a frame, or stand, with four legs, &c.

C, An Octagon Bee-Box, one foot two inches in diameter, and ten inches high, with glass windows and window-shutters, which may be occasionally opened, as represented in this Box, where the shutters are taken off to see the working of the bees; this Box

Q

is

is placed on the floor B, and is properly luted thereto, leaving sufficient room for a landing-place for the bees on the front or fore edge of the floor. On the top of the Box there is a square hole, covered with the sliding valve, or wooden shutter, four inches broad, which is occasionally drawn out to make way for the bees to go up into the straw hive, when for want of room they are about to swarm, and fly off, which by this contrivance is entirely prevented, and the lives of the bees preserved.

D, A Straw Hive, somewhat flatter on the top than common straw hives; where there is also a hole covered with a sliding valve, which opens a communication between the straw and the glass hive, for the purpose before mentioned.

E, A Glass Hive, eight inches and an half in diameter at the base, and ten inches and an half high, with a brass handle fixed on its apex.

F, A Brass Handle, fastened to the head of the hive, with which it is occasionally lifted up to take out the honey and wax.

G, A round Stick, or Slip of Wood, about an inch in diameter, fixed in a perpendicular position in the center of the hive, to which is fastened another Stick of about the same dimensions, extending horizontally from one side of the hive to the other; these Sticks serve to support and steady the loaded combs, and prevent them from breaking with their own weight, or by any accidental shock, &c.

H, A Brass or Tin Sliding-Valve, eleven inches long, and four inches broad.

I, I, I, I, Four Glass Windows, with shutters, which are taken
off

off occasionally to see the working of the bees, as represented in this view of the octagon hive.

K, A Wooden Sliding Valve, ten inches long, four inches broad, and a quarter of an inch thick; when the bees are like to swarm, these Valves, as before-mentioned, are to be drawn out to make way for them to go up into the hive above, which they will readily do without swarming, or flying off; and at night, when the new and old swarms are both quiet in their hives, the communication between the two hives is to be shut up, by thrusting the Valve into its place.

L, An Aperture, three inches long, and three-eighths of an inch broad, through which the bees enter into their new habitation.

M, M, Two Brass Handles, by which the hive is lifted up from the floor.

C H A P. XXI.

A Description and Explanation of the BRABANT and HAIN-AULT REAPING-SCYTHES and STAFF-HOOK, presented to the Society by WILLIAM HANBURY, Esq; June 1, 1763.

FIG. 2. *A perspective View of the BRABANT-SCYTHE.*

A, **T**HE Blade of this Scythe, is two feet ten inches long, and three inches and an half broad at the heel.

B, An

B, An Iron Ring or Ferril, and Wedge, with which the scythe is fastened to the snead.

C, The Snead, or Handle, is three feet seven inches long, having a crutch head, which is placed under the right arm of the reaper when he uses the scythe.

D, A Slip of Leather, sixteen inches long, and one inch broad; one end of it is nailed to the snead, the other has a slit or loop in the end of it; for the reaper to put his thumb into; which done, he wraps the slip of leather round his hand, the better to secure and steady the scythe.

E, The Gras, or Handle, is fastened to the snead with an iron wedge, and an iron ferril, whose shank passes through the Gras, and is rivetted to the end of it.

F, A curved Piece of Wood, fastened to the end of the snead, which is placed like a crutch under the right arm of the reaper, and serves as a fulcrum, or center of motion of the scythe; the reapers use this scythe with the crutch-head under the right arm, and a staff-hook, like the Hainault hook in the left hand.

F I G U R E III.

A perspective View of the HAINAULT REAPING-SCYTHE.

A, The Blade, is one foot eight inches long, and its extreme breadth is three inches, gradually diminishing towards its point and heel; its back edge, from the extremity of its breadth to its point, forms a curve nearly to a fourth part of a circle, whose radius is five inches; the blade of this scythe is not flat like other scythes,

scythes, its under side being turned up rounding, especially towards its heel, where its back edge is set up, so much as to shape its upper surface almost as hollow as a common table-spoon.

B, An Iron Ferril and Wedge, with which the scythe is fastened to the snead.

C, The Snead of this Scythe, is two feet two inches long, one inch and an half broad, and one inch and a quarter thick, at its under end.

D, A Slip of Leather, or Loop, fastened to the upper end of the snead for the purpose before-mentioned.

F I G U R E IV.

A perspective View of the STAFF-HOOK.

A, The Staff of the Hook, is four feet long, and about an inch broad, by one inch thick; it is used with the left hand to collect the corn in such small parcels as the reaper's strength or dexterity can cut off at a stroke, with the scythe in his right hand, which alternately follows the motion of the Staff-Hook in his left.

B, A round Iron Hook, whose back edge forms a curve, which is part of a circle, whose radius is five inches; its shank or butt-end is split and laid open, to embrace the end of the staff, and is shaped like a wedge, and inserted into the split end of the Hook, which is fastened with iron rivets to the staff.

C, The Mortise in the End of the Staff, is of no other use than to pass a leather strap or cord through, when the staff-hook, scythe,

scythe, &c. is to be tied up in a bundle to be carried on the reaper's shoulders.

D, A Leather Loop, fastened to the staff, for the fingers of the left hand to pass through, to steady the hand, and to keep the grasp at a proper distance from the ground.

E N D O F B O O K I.



B O O K II.

O F

A G R I C U L T U R E ;

C O M P R E H E N D I N G

A short Account of such of the Ploughs, Machines, and Models, in the Society's Repository of Agriculture, as are not yet delineated.

C H A P. I.

A short Description of Mr. CLARKE'S DRAIN-PLOUGH.

THIS Plough, with several others, were tried on *Epping-Forest*, in presence of the Committee of Agriculture. These Ploughs were all intended to cut a drain one foot deep, twenty inches wide at top, and ten at bottom ; the sides equally sloping, the earth raised and delivered on the surface of the ground
at

at each side of the drain. The Ploughs were first tried with six horses, but as the ground was very stiff, and a little stoney at the bottom, their strength was not sufficient to overcome the resistance; it was therefore resolved, to add two more horses to the team, which also proved ineffectual, for the reason before-mentioned. The Committee therefore appointed another time and place where the ground was more proper for the experiment. Accordingly a second trial was made on ouzy ground, where the ploughs before-mentioned were worked with eight horses, and performed to the satisfaction of the Committee, and many others, who were of opinion, Mr. *Clarke's* Plough was preferable to the Ploughs of the other candidates; in consequence of which the Committee Resolved, That Mr. *Clarke* was intitled to the premium of fifty pounds; to which the Society agreed, *October 8, 1766.*

The beam of this Plough is eight feet long, six inches broad, and three inches and three quarters thick at the tail end, tapering from the sheat to its fore end, which is mortised into the middle of a transom, or cross rail, to which it is fastened with a square iron bolt and wedge. At each side of the beam there is a square shaft, curved and tapered in the same manner as the beam. The fore ends of these shafts are mortised into the transom, or cross rail, at the fore part of the plough; their back ends extending about four feet therefrom, are fastened together with a bar, or slip of wood, and two trundles, which pass through the shafts and the beam; the distance of the shafts from each other, is two feet two inches from out to out. There is a roller or gage fixed to the fore end of the plough, to regulate the depth of the drain; this
roller

roller is eleven inches in diameter, and twenty inches broad on its periphery. At each end, and in the middle of the roller, there is a comb, or thin plate of iron, fastened thereto with wood-screws. These plates are three inches larger in diameter than the roller, and are intended to cut the ground before the coulter, which are supposed to follow in the same tracts. This roller turns in two angular iron frames fastened to the under sides of the two shafts, connected to the beam as before-mentioned. The under ends of the three coulters are inserted into the angular points of the share; the upper ends of the two side coulters are fastened to the shafts, and the upper end of the middle coulters is inserted into the beam, and fastened thereto with wedges. The extreme width of the share is ten inches; the length of the Plough from the point of the share to the tail-end of the ground-rest, is three feet six inches.

N. B. The ingenious inventor of this Plough, having discovered some improvements which for a trifling expence might be added to this useful instrument, took the first opportunity to make another Drain-Plough, on the same principle as the former; to which are added the following improvements, viz.

The gage or roller of this Plough is of the same dimensions as the former, but has only one comb, or iron plate, which is fixed in the middle of its periphery, projecting three inches beyond its surface; the iron frame which contains it is connected to a quadrant or segment of a circle, pierced with holes, which serve to elevate or depress the roller; by which means the depth of the drain is partly regulated, and the point of the share set in a proper direction.

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The other improvement is in the double mould-board, which, in the original Plough, is permanently fixed to the beam, ground-reft, &c. but in this the inventor has contrived two moveable blocks of wood, which at pleasure may be set higher or lower on the mould-board, to which they are so judiciously shaped and fitted as to turn and deliver the earth as it rises on the mould-board, (which is an inclined plane, whose expansion encreases with its elevation) by which means the Plough may in a few minutes be set to make trenches of divers breadths and depths.

This Plough the Society purchased of Mr. *Cuthbert Clarke*, June 8, 1767.

C H A P. II.

A Short Description of a LAND-ROLLER, taken from a Model made to a Scale of Four Inches to a Foot; presented to the Society by JAMES SCAWEN, Esq; August 13, 1767.

THIS Roller is divided into three equal parts, or Rollers, each of them eight inches long, and six inches and a quarter in diameter. Each Roller turns on a separate axis, in two distinct frames, which are formed and connected as under-mentioned; the fore frame is one foot square, and contains one division of the Rollers, whose axis turns in two semicircular cheeks mortised into the under side of the frame; at whose inner end there is a semicircular piece of wood, or sway-bar, mortised into the sides of the frame, to which the thill or shafts for the horse are fastened as usual with an horizontal iron bolt. The hind

hind frame is two feet by one, from out to out, and contains two divisions of the Roller, which turn in three semicircular cheeks, mortised into this frame in the same manner as the cheeks of the other frame. The two Rollers contained in this frame are fixed in a straight line with each other, leaving an interval of three inches between them, and are five inches and an half distant from the fore Roller, when they are set truly parallel to each other. These frames and Rollers are connected by a perpendicular iron bolt, which passes through the frames, &c. and is the center of the sway-bar's motion, when the fore frame with its Roller turns to the right or left.

C H A P. III.

A short Description of M. DE CHATEAU VEAUX'S SINGLE CULTIVATOR.

THE beam of this Cultivator is nine feet six inches long, including the two detached shafts framed thereto, and to which the carriage-wheel is fastened; the wheel is two feet ten inches in diameter, and two inches broad on its periphery. This instrument is held and directed with two forked handles, mortised into the end of the beam. The share is eighteen inches and an half long, including its point, which is nine inches and a quarter long, and two inches broad, having an angular crest on its upper surface. Its extreme width at the heel, is eleven inches and an half; to which is welded a perpendicular shank, eight inches and

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an half long, with an horizontal arm seven inches in length, at whose extremity there is a perpendicular return about two inches long. This short return is inserted into a hole in the under side of the beam, in which there is also a groove, or channel cut, to receive the horizontal arm, which is let in even with the surface of the beam, and fastened thereto with a strong iron ferril and wedge. At the fore ends of the two detached shafts or beams, there are two iron hooks or staples to which the horse is fastened.

C H A P. IV.

A short Description of Mr. DE CHATEAU VEAUX's DOUBLE CULTIVATOR, for loosening the Earth, and destroying Weeds in the Alleys between the Drills.

THIS instrument is made with two shares, exactly on the same construction as the single cultivator; but the manner of fixing them is very different. The share of the single cultivator is fastened to the beam, but the shares of this cultivator are detached from the beam, and fastened to two square shafts, framed to the beam with two slips, or flat pieces of wood, mortised into the beam, and each of the shafts. The two slips are pierced with holes for the conveniency of setting the shafts with their

their shares, wider or closer to the beam, according to the distance of the two intervals from each other.

The shares are fastened to the detached shafts with iron ferrils and wedges, in the same manner as the share of the single cultivator. The forked handles are also fastened to the beam in the same manner as the handles of the single cultivator.

The carriage wheel is two feet ten inches in diameter, and two inches on its periphery, as before-mentioned. Its nave or axis, is one foot eight inches and an half long, and five inches and an half in diameter. In the middle it turns on two iron gudgeons, inserted into the detached shafts, framed and properly fastened to the beam, in the same manner as the shafts of the shares are. There is an iron hook fastened to the fore end of each of those shafts, to which the traces are linked for the horse to draw by.

N. B. These cultivators were procured by M. *De Chateau-Veaux*, at the Society's expence. The maker of them, in order to render them as cheap as possible, has so contrived the carriage-wheel, and the two fore shafts, as to fit either the single or the double cultivator; but as the frequent putting the slips, &c. in and out of the mortises, is apt to loosen and injure the instrument, many people are of opinion, that it would be better to have a wheel and shafts, &c. fitted to each instrument.

C H A P V.

*A short Description of Mr. CHARLES LLOYD'S CYDER-MILL,
taken from a Model, made to a Scale of One Inch to a Foot.*

THIS model is a frustrum of a cone, constructed nearly on the same principle as a common coffee-mill, but has the nut and shell made of stone, instead of steel, and the ribs, or teeth, are made nearly in the same spiral form as the teeth of a common steel-mill, but much larger, and not so thin on their cutting edges. The shell, or concave part, is three inches in diameter at its base, and one inch at its vertex. Its perpendicular height is about four inches. This shell is permanently fixed on its base to the floor, and is at all times in a state of rest; whilst the nut, or convex part is actuated by the first mover, which is an horizontal crown wheel, seven inches and three quarters in diameter, with one hundred and sixteen cogs. This wheel gives motion to an horizontal shaft, on which there are two vertical crown-wheels, one of them four inches in diameter, with forty-eight cogs, actuated by the large horizontal crown-wheel, the first mover; and the other, whose diameter is five inches and three-quarters, with sixty-six cogs, is connected to a perpendicular trundle, or wallower with eleven rounds, whose spindle passes through the nut, or solid cone, to which it is fastened with wedges through the spindle. The horizontal crown-wheel, or first-mover, is
fixed

fixed to a perpendicular shaft, to which there are three horizontal shafts, whose radius is eight inches, and their height from the ground is parallel with the breast of middle sized horses, which is the power made use of to work this mill. The apples are put into a hopper fixed over the vertex of the shell, or hollow cone, where they are ground, and discharged at its base upon a large tub, covered with hair-cloth: the juice issuing therefrom, being strained through it, is conveyed off into a vessel properly placed to receive it, and the pulp removed to the press to be squeezed by the combined powers mentioned in the description of the cyder-press.

The model of this mill and Cyder-press were purchased of Mr. *Lloyd*, for the sum of twenty guineas, *March 25, 1761.*

C H A P. VI.

A short Description of Mr. LLOYD'S CYDER-PRESS, taken from a Model made to a Scale of Two Inches to a Foot.

THIS machine expresses the juice from the pulp of the apples, by means of a beam, or lever, which, according to the model, is twenty one inches long, one inch and a quarter broad, three quarters of an inch thick at its back, or fulcrum end, and three quarters of an inch square at its point or fore end; to which is hung a weight, or weights, sufficient for the purpose intended. The inventor of this machine thinks this method of expressing the
juice

juice from the apples, preferable to the screw-press, which gradually loses its effect as the juice oozes from the pulp; whereas the lever and weight follow the pulp, or cheese, as some people call it, as it diminishes in bulk, and presses it at all times with equal force: the lever, &c. is taken up and down as occasion requires, by means of a windlass, pawl and pulleys, very handy, and judiciously fixed for that purpose. At the inner end of the press, there is a post ten inches and a quarter long, two inches broad, and one inch and three-eighths thick; in the middle of this post there is an aperture or mortise four inches long, and half an inch broad; through which is inserted a strong tenon, cut in the end of the lever; this tenon is occasionally moved higher or lower in the aperture, according to the height of the cheese or pulp. At the fore end of the press there are two posts, six inches and three-quarters long, half an inch broad, and a quarter of an inch thick, distant from each other one inch and an half; their upper ends are mortised into a transom, or piece of wood, three inches long, five-eighths of an inch broad, and a quarter of an inch thick, to which there is a pulley properly fixed for taking the lever up and down, as before-mentioned: these posts serve to direct the fore end of the lever, as it moves up and down; and also as a fixture for the windlass, and some other parts of the press.

The inventor of this press thinks this method of expressing the juice from the apples, preferable to the screw-press, which gradually loses its effect, as the juice oozes from the pulp; whereas the lever and weight follow the pulp, (or cheese, as some people call it) as it diminishes in bulk, and presses it at all times with equal force.

C H A P. VII.

A short Description of an APPARATUS, or Temporary Covering for Stacks of Corn, Hay, Wood, &c. taken from a Model made to a Scale of Two Inches to a Foot; presented to the Society by
 RICHARD LOVEL EDGEWORTH, Esq;

THIS Apparatus is constructed much on the same principle as an umbrella: its stem or pole is two feet long, and five-eighths of an inch in diameter: its upper end is made into a screw, about thirteen inches long, to which is fitted a wooden nut, two inches in diameter, and half an inch thick: on the upper side of this nut there are eight iron pins, fixed equi-distant from each other, and are used to hook the lines over when the arms of the machine are expanded, &c. There is another nut of the same dimensions as that before-mentioned, which is also fitted to the screw part of the stem: these nuts are framed together with eight wooden bars, five inches and an half long, half an inch broad, and one-eighth of an inch thick; the under or last-mentioned nut, is circumscribed with an iron ring, or piece of wire, let into a groove in the edge of the nut, in which nut there are eight notches, about one eighth of an inch broad each. The concentric ends of the eight arms before-mentioned, are inserted into these notches, in which they occasionally turn freely up and down on the wire or ring let into the groove for that purpose.

S

These

These arms are one foot three inches long, one quarter of an inch broad, and one-eighth of an inch thick ; the outer ends of the arms are fixed at equal distances, by a cord tied from one arm to the other, and by a piece of painted canvas fastened thereto to keep the rain from the corn, &c. The smooth end of the stem, or pole, is inserted into the stack of corn, or hay, to secure it from storms of wind, &c.

C H A P. VIII.

A short Description of the Rev. Mr. GAINSBOROUGH'S DRILL- P L O U G H.

THIS Plough makes three drills, sows and covers at the same time : it consists of the following parts and movements, viz. three taper binns, or hoppers : these hoppers are filled with corn or feed, which is conveyed into three triangular trunks, whose under ends are shod with iron, properly shaped to make the trenches, or drills ; the points or under ends of the trunks may be set to make the trenches or drills deeper or shallower in the ground, by moving occasionally three iron pins, properly fitted for that purpose ; the plough is built on three fills, four feet long ; the middle fill is six inches broad, and five inches thick ; the two side fills are also six inches broad, but only three inches

inches thick ; these fills are fixed equi-distant from each other, extending two feet three inches from out to out, and fastened together with two traverses, or cross rails, mortised through the fills. This plough moves on three carriage wheels, made of wood, eight inches and a quarter in diameter, and two inches thick on the periphery ; the fore wheel is fastened to the end of the middle fill ; and the two others, to the back ends of the side fills. There are also two iron wheels fixed to the sides of the Plough, which roll on the ground to give motion to the three small wooden rollers hereafter mentioned. The wheels are two feet two inches in diameter, and a quarter of an inch on the periphery ; the axis of these wheels passes through, and gives motion to three small grooved rollers, fitted into the mouths, or upper ends of the trunks ; on which rollers, the corn is received, and as it were numbered into the throat of the trunks, from whence it is conveyed into the drills, and properly covered with a harrow fitted for that purpose.

This Drill-Plough, with several others, were tried in a ploughed field at *Brompton*, in presence of the Committee of Agriculture, who resolved that the premium of fifty pounds, offered for the best Drill-Plough, should be divided as follows, between the two candidates, the Rev. Mr. Gainsborough and Mr. Willey : to the former, 30*l.* to the latter 20*l.* to which the Society agreed, *May* 14, 1766.

C H A P. IX.

*A short Description of Mr. WILLEY'S DRILL-PLOUGH,
with One Wheel.*

THE frame of this Plough is seven feet two inches and an half long, (including its handles) and two feet eight inches broad, from out to out.

The carriage wheel is three feet two inches in diameter, and two inches and a quarter broad on its periphery ; its axis is made of wood, to which is fixed a wherrer, or pulley, with an angular groove, in which there is a band or cord connected to another wherrer, which wherrer is fastened to the iron axis of the feed-box. This feed-box is two feet one inch long, and twelve inches and an half diameter, with a partition in the middle to make it answer the purpose of two separate feed-boxes, which drop the feed or grain into two taper trunks, whose points or under ends are shod with iron properly shaped to make the trenches or drills for the corn, &c. These trunks are occasionally set at a greater or less distance from each other, by two iron screws fixed for that purpose in the side rails of the carriage frame ; the fore ends of these rails are connected with the thill or shafts, and their back ends, being rounded off and properly shaped, are the handles by which the Plough is held and directed. There is a traverse, or cross
brace,

brace, at the back part of the frame, which is four inches broad, and three inches thick, having two long mortises cut through them, in which are inserted two staves, which extend to the ground, and serve (when properly set, with wooden wedges made for that purpose) to cover the corn in the drills.

This Plough was made by Mr. *Willey*, the inventor of the Drill-Plough, represented in Plate 1, and 2, page 35; and as the Plough he described is less complicated and much cheaper than the other, it was recommended to the Society on that account; but most people are of opinion, that the first Plough is preferable to the Plough above-mentioned; which was purchased by the Society, *June 24, 1767.*

C H A P. X.

A short Description of Mr. BESTLAND'S DRILL, taken from a Model, made to a Scale of an Inch and an Half to a Foot.

THIS Drill moves on three carriage-wheels; the fore-wheel is two inches in diameter, and half an inch broad on its periphery: it turns in a flat iron frame, with a round shank, which passes through, and turns in a round hole in the fore end
of

of the beam. The two hind wheels are one inch and a quarter in diameter, and three-eighths of an inch broad on their peripheries. The axle-trees of these wheels are each seven inches and a quarter long, and half an inch square. There are two tongues, or thin slips of wood, five inches long, half an inch broad, and one-eighth of an inch thick, mortised into the ends of this axle-tree, which, with the wheels, &c. are connected to the triangular frames with hinges, and two iron pins through a double rank of holes in the tongues or slips before-mentioned. The fore end of the beam is suspended on the shoulders, or upper ends of the iron frame of the fore carriage-wheel. The back end of the beam branches off into two curved arms, extending eight inches from their shoulder, and are ten inches distant from each other at their extremities. The length of the fore end, or straight part of the beam, is eight inches from its point to its shoulder. On the curved arms of the beam there are two triangular frames, one over the other, in an inclined direction. Their under ends turn on hinges fixed to a traverse, or cross rail, at the tail of the drill; by which means their points or upper ends are easily elevated, or depressed, by moving an iron pin in a quadrant, or segment of a circle, which passes through a mortise in the upper ends of the said frames. By this contrivance, the shares, which are fastened to these frames, are set deeper or shallower in the ground at pleasure.

This instrument has nine shares, five whereof are fastened to the bars of the upper triangular frame, and four to the under frame; the former are fixed behind the latter, and stir the ground in the intervals between the shares of the latter. There is an
iron

iron staple and hook rivetted to the iron frame of the fore carriage wheel, to which the cattle are fastened to work the Drill.

This machine for making close drills was invented by Mr. *Nathaniel Bestland*, for which he had a bounty of ten guineas, *February 23, 1769.*

The following Observations on Drill Husbandry was made by Mr. *Bestland*, and sent with his Model to the Society.

“ If land is properly prepared and drilled, it will be seeded with half a bushel in an acre less than in the common hill country way. By its being let down upon such a firm bottom, it strikes a stronger root, and its lying low in the ground makes no great shew in the winter; but in the spring it recovers its colour, and carries its proof fuller to the harvest, and is better preserved from the birds at the time of sowing. I always make use of it as a drag to prepare the land, and find it to answer better than any I ever tried before.

“ This manner of preparing the land some time before it is sowed, often sets those weeds a growing to which it is most subject, and when these weeds are up, the drilling and harrowing, when the wheat is sowed, will certainly destroy them, and in a great measure preserve the whole crop.

“ Four horses can draw this instrument, but it is usual to drive five, as they can draw it over seven acres in a day.”

C H A P. XI.

*A short Description of Mr. JOHN WINN BAKER'S SCARIFI-
CATOR, presented to the Society, April 7, 1767.*

TH E carriage-wheel of this instrument is two feet eight inches diameter, and two inches broad on its periphery; its axis or spindle turns in two sliding pieces of wood, fitted to the shafts of the carriage-frame; these sliders serve to set the wheel higher or lower, by which means the coulter enters deeper or shallower into the ground at will.

The machine consists of two parts. 1st, The wheel and carriage-frame. 2^d, The beam with its coulters, &c. The whole joined together is eight feet one inch long; its fore part contains the carriage-wheel fixed to two sliders, as beforementioned; its back part contains the beam, with its side pieces, &c. in which are fixed five coulters, so placed as to form an angle of seventy-five degrees; the four foremost coulters are fixed two a-breast, converging as they approach towards the fifth or single coulter, fixed in the angular point at the tail end of the beam, and in a straight line with the carriage-wheel, distant from the foremost coulters one foot eleven inches; the coulters thus fixed, cut parallel gashes in the ground two inches three quarters distant from each other, and by means of the sliders and wedges beforemen-
tioned,

tioned, may be set to any depth required from one to five inches: the handles of this instrument are fastened to the sides of the beam; which beam is four feet ten inches long, and three inches square: on each side of the beam there is firmly fastened a thick piece of wood, wherein there are four mortises pierced for the four foremost coulters, which are fastened thereto with wooden wedges: the beam extends nineteen inches from the fore ends of these side pieces, and is fastened to the carriage-frame with two cross bars: this frame consists of two square shafts and three cross bars; the foremost bar is fourteen inches long, four inches broad, and one inch and a quarter thick: this bar is mortised into the fore ends of the two shafts, leaving sufficient room for the carriage wheel to move freely in the interval between the head of the beam, and the said bar; in the middle of it there is a hole for an iron link and hook, to which the cattle are fastened: the two other bars are fourteen inches long, three inches broad, and one inch thick: these bars pass through the fore ends of the beam, and the back ends of the shafts of the carriage frame, by which the fore and back parts of the instrument are connected, and properly fitted for the purpose intended.

C H A P. XII.

A short Description of a HAND-DRILL, for Garden-Seeds, invented by JOHN ARBUTHNOT, Esq; and presented to the Society, May 4, 1769.

THIS Drill is made of a forked stem or pole, whose prongs or arms are flatted, and properly shaped, to comprehend a wheel, fixed to a wooden axis, which turns in two round holes in the ends of the said arms, each of which is sixteen inches long, three inches and an half broad, and one inch and an half thick. The stem, or pole, from its point, or extremity, to the shoulder of its arms, is three feet five inches long, and three inches and an half in diameter. The stem is slit or sawed through from end to end, and divided into two equal parts, for the convenience of putting in and taking out the carriage-wheel, with its axis, &c. and fastened together again with four wooden pegs, and a wooden trundle, which passes through the end of the stem, and serves as a handle to work the drill with.

The wheel is one foot in diameter, and two inches and an half broad on its periphery. The axis is two feet six inches long, and one inch and a quarter square in the middle, and round from the insides of the arms to its extreme ends; on each of which is fixed a small keg, or barrel, eight inches long, and six in diameter, pierced with holes of different sizes, according to the sort of grain
or

or seed to be sown; and such holes as are not in immediate use, are stopped with corks. These barrels, being fixed to the axis, turn with the carriage-wheel, and drop their contents in ranks on the ground, which contents are covered as the drill goes on with a rake or harrow, properly fitted for that purpose, and hung to the round part of the axis: the arms of the harrow, thus connected to the axis, are one foot nine inches long, an inch and an half broad, and one inch thick.

C H A P. XIII.

A short Description of a MODEL of a MACHINE for drawing up Trees by the Roots; presented to the Society by RODOLPH VALTRAVERS, Esq;

THIS Machine consists of two standard posts, each three inches square, with an interval of three inches between them; the posts are fastened together at top and bottom by two cross pieces; the pins are one inch and a quarter diameter, and the holes one inch and an half in diameter; the foot of the standard must be rested on some flat piece of wood, or stone, and abutted with stakes or little piles driven into the ground. The second part of the machine is a ram, made of elm, or any other straight grained wood, least liable to split, bend, or give way.
The

The head of the ram is armed with a strong piece of iron divided into three points, in order to bite against the tree: the standard of the ram is eight inches by six, when squared, and divided into two legs, from the bottom up to the first iron ferril or clamp, in which there is a pulley of four inches thick, and nine inches in diameter; the rest of the aperture, from the first to the second clamp, is fitted and joined again by a wedge, so that the remainder of the ram is solid: this ram, with its pulley, is sustained with a chain about ten feet long; the links of which are four inches and ten-twelfths of an inch in length: this chain passing through the legs of the ram, is fastened by one end to the top of the standard post; the other part of the chain passes under the pulley, and its other extremity terminates in a link with two handles, to which the hook is fastened. Through the substance of each of the legs of the ram, there are two iron bands, which, with an iron roller passing through their other extremities, embrace the two standard posts in such a manner, that while the ram is sliding up and down, its base is secured from flying away from the standard.

The third part is the crook, the whole of which, with its arm and little arch, is made of iron; the arm above the crook is two inches thick, gradually diminishing towards the arch, which is but a quarter of an inch thick; the handle of the lever is bound with rings, forked near the crook, and divided by a groove pierced with holes, in order to stop the hole with iron pegs, as occasion requires. Six or eight men can manage this machine with great ease; one to move the lever pins, three to the lever, and three or four to work a windlass, with a rope fastened to the top of the tree to direct its fall.

B O O K III.

C H A P. I.

A LIST of the Noblemen and Gentlemen, who for their eminent Services have been presented with the Society's Gold Medal.

T O the late Right Hon. Jacob Lord Viscount Folkstone, Prefident of the Society for Arts, Manufactures, &c.	-	-	-	a gold medal.
To the Right Hon. Robert Lord Romney, Vice- Prefident, now Prefident,	-	-	-	a gold medal.
To Sir Charles Whitworth, V. P.	-	-		a gold medal.
To Edward Hooper, Esq; V. P.	-	-		a gold medal.
To the late George Eckerfall, Esq; V. P.	-			a gold medal.
To William Fitzherbert, Esq; V. P.	-	-		a gold medal.
To Henry Baker, Esq.	-	-	-	a gold medal.
To Charles Stewart, Esq.	-	-	-	a gold medal.
To Mr. William Shipley,	-	-	-	a gold medal.

A List

C H A P. II.

*A List of the Authors who have obtained Honorary Premiums
for Treatises on the Culture of WHEAT, BARLEY, LUCERN,
TURNIPS, &c.*

1766. **T**O Sir Digby Legard, of Ganton,
Yorkshire, Bart. for an account of
the most profitable manner of cultivating
Barley ; } a gold medal.

To the Rev. Mr. Lowther, Rector of Aikten,
near Carlisle, Cumberland, for an account of
the most profitable method of cultivating
Wheat ; } a gold medal.

To William Taylor, Esq. of Cannon-hill Surry,
for an account of the most profitable method
of cultivating Lucern ; } a gold medal.

To Mr. John Willey, of South Petherton, in
Somersetshire, for an account of the most pro-
fitable method of cultivating Turnips ; } a gold medal.

1767. To Christopher Baldwin, Esq. of Clapham-
common, Surry, for an account of the most
profitable method of cultivating Lucern ; } a gold medal.

To Matthew Cox, Esq. of Walhampton, near
Lymington, Hants, for an account of the most
profitable method of cultivating Wheat ; } a gold medal.

To

To Robert Colville, Esq. of Newton, near Wisbich,
in the Isle of Ely, Cambridgeshire, for his
account and cultivation of Turnip-Cabbage; } a silver medal.

1768. To Robert Barber, Esq. at Gover, near
Exeter, for promoting the Views of the Society
with respect to his introducing the culture of
Burnet, as an article of Husbandry; } a gold medal.

1769. To Arthur Young, Esq. of North-Mims,
Hertfordshire, for culture of Cole-feed; } a gold medal.

To Mr. Philpot Chambers, for his account of cul-
tivating Turnips with Beans; } a silver medal.

1770. To Mr. Jeffard Minster, in the isle of
Thanet, Kent, for his observation on the Turnip-
rooted Cabbage; } a silver medal.

To the Rev. Mr. Davies Lamb, M. A. for his ob-
servation on Timothy Grass, Burnet, and Turnip-
rooted Cabbage; } a silver medal.

C H A P. III.

Honorary Premiums for sowing A C O R N S.

1758.	T O his Grace the Duke of Beaufort,	Acres.	Medals.
	for sowing - - -	23	a gold medal.
1759.	To Dennis Rolle, Esq. for sowing	23	a gold medal.
	To Philip Carteret Webb, Esq. for sowing	21	a silver medal.
	To Mr. John Romey,		a silver medal.
	To Mr. Thomas Drew, for sowing	10	a silver medal.
	To Mr. John Berney, for sowing	5	a silver medal.
1762.	To Edward, Earl Winterton, for		
	sowing - - - -	20	a gold medal.
	To his Grace the Duke of Bedford, for		
	sowing - - - -	11	a silver medal.
1763.	To George Forster Tuffnell, Esq.		a gold medal.
1764.	To John Buxton, Esq. of Rushford,		
	Norfolk, for sowing - - -	22	a gold medal.
1766.	To Blunden Moore, Esq. of Byfleet,		
	Surry, for sowing - - -	37	a gold medal.

Honorary Premiums for planting SCOTCH FIRS.

	Plants.	Medals.
1761. TO Robert Fenwick, Esq. of Limington, Norfolk, -	104000	a gold medal.
To Dennis Rolle, Esq. for planting	100394	a gold medal.
To Robert Sutton, Esq. for planting	24000	a filver medal.
To Matthew Lee, Esq. for planting	6000	a filver medal.
1763. To Francis Trotman, Esq. for planting - - -	30000	a gold medal.
To Thomas Batchelor, Esq. for planting	16000	a filver medal.
To his Grace the Duke of Bedford, for planting - - -	16000	a filver medal.
1764. To Robert Fenwick, Esq. of Limington, for planting —	104000	a gold medal.
To John Mount, Esq. of Washing, Berks, for planting - -	14000	a filver medal.
1765. To Robert Fenwick, Esq. for planting — —	102000	a gold medal.
1766. To ditto, for planting -	100000	a gold medal.
To the Hon. Lord Scarfdale, for planting	18000	a filver medal.
1767. To John Wright, Esq. of Lom- bard-street, for planting —	46000	a gold medal.
1769. To William Beckford, Esq. of Font-hill, for planting —	610800	a gold medal.
To Matthew Barnes, Esq. of Wilton, near Norwich, —		a filver medal.

Honorary

Honorary Premiums for planting C H E S N U T S.

	Acres.	Medals.
1763. T O John Freeman, Esq. of Shute Lodge, for planting	2	a gold medal.
To George Forster Tuffnell, Esq. for planting — —	5	a gold medal.
Plants.		
1767. To Lord Viscount Turner, for planting - - -	12000	a gold medal.
To Edward Jacob, Esq. of Nackington, for planting - - -	9000	a gold medal.

Honorary Premiums for Small Leaved English E L M S.

	Plants.	Medals.
1763. To the Earl of Portsmouth, for planting - - -	6000	a gold medal.
1765. To William Earle, Esq. of Malmsbury, for planting -	14900	a gold medal.
1766. To John Freeman, Esq. of Shute Lodge, for planting —	2140	a gold medal.
1767. To Edward, Earl Winterton, for planting — — —	2000	a gold medal.

C H A P.

C H A P. IV.

Honorary and Pecuniary Premiums given for planting MADDER.

TO John Arbuthnot, Esq. of Mitcham, for
 planting sixteen acres of madder, in the } a gold medal.
 parish of Morden, Surry,

1755. To Mr. Thorp, for raising and curing twenty pounds	£.
weight of good madder, - - - - -	30
1758. To Mr. Nicholas Crisp, of Bow Church-yard, for	
producing the largest roots of three years growth,	
twenty in number, - - - - -	20
To Mr. Samuel Shaw, for producing the largest roots of one	
years growth, twenty in number, - - - - -	10
To Mr. John Rose, for producing the largest roots of two	
years growth, twenty in number, - - - - -	10
To Mr. Suter, for producing the largest roots of one year's	
growth, twenty in number, - - - - -	8
1759. To Mr. Samuel Shaw, for planting the best of two	
years growth, - - - - -	20
To Mr. John Suter, of Barnes, Surry, for ditto, - - -	16
To ditto, for ditto, of one year's growth, - - -	10
To Mr. Brounton, a second premium, for ditto - - -	8

The

*The following Persons received Five Pounds per Acre, for
planting M A D D E R.*

	Acres.	£.	s.
To Mr. William Kemp, for planting -	10	50	0
To John Cooke, Esq; of Tandridge, Surry, for planting - - - -	1	5	0
To Mr. William Cox, for planting -	9	45	0
To William Trevilian, Esq; for planting -	1	5	0
To Mr. William Wilcocks, for planting -	3	15	0
To Mr. John Goddard, of Ditchling, Suffex, for planting - - - -	1	5	0
To Mess. Kemp and Lane, Teynham, Kent, for planting - - - -	29	145	0
To Mr. William Fairman, for planting -	1	5	0
To Mr. John Thorp, of Thames Ditton, for planting - - - -	4 $\frac{1}{2}$	22	10
To the Rev. Mr. John Baber, of Great Chesterford, for planting - - - -	3	15	0
To Mr. John Simmons, of Preston, Kent, for planting - - - -	1	5	0
To Mr. John Harrison, of Preston, Kent, for planting - - - -	1	5	0
To			

To William Hutchens, Esq; of Barns, Surry, for planting - - - - -	Acres.	£.	s.
	10	50	0
To Mess. Humphreys and Vinal, for planting	1	5	0
To the Rev. Mr. John Peele, Tilney, Norfolk, for planting - - - - -	1	5	0
To Mr. William Pickering, for planting -	1	5	0
To Mr. James Cole, of Ditchingham, Norfolk, for planting - - - - -	3 $\frac{1}{4}$	16	5
To Mr. Daniel Colgate, for planting -	1	5	0
To Mr. Francis Harris, Iver, Bucks, for planting	1	5	0
To Mr. Joseph Mace, for planting - - -	2	10	0
To George Forster Tuffnell, Esq; for planting	6	30	0
1764. To Mr. John Ransom, of Stow Market, for planting - - - - -	1 $\frac{1}{2}$	7	10
To Mr. * <i>Gabriel Curner</i> , of North Matford, Devon, for planting - - - - -	10	50	0
To Mess. Abraham Preble, and Joshua Royle, of St. Marys, Northgate, Canterbury, for planting	15	75	0
To Mess. Lane and Kemp, of Teynham, Kent, for planting - - - - -	7	35	0
To Jacob Pattison, Esq. of Whittam, Essex, for planting - - - - -	1	5	0
To Mr. William Goffe, of Ringwood, Hampshire, for planting - - - - -	2	10	0
To the Rev. Mr. John Peele of Tilney, Norfolk, for planting - - - - -	1	5	0
To			

* Paid to Dr. John Stephens.

To Mr. James Cole, of Ditchingham, Norfolk, for planting - - - - -	Acres.	£.	s.
	1	5	0
To Mr. Francis Harris, of Iver, Bucks, for planting - - - - -	1	5	0
To Mr. John Ranfom, of Stow Market, for planting	2	10	0
To Mr. Joseph Flight, of Battersea, Surry, for planting - - - - -	3	15	0
To Mr. John Flight, of Thames Ditton, for planting - - - - -	2	10	0
To William Hutchings, Esq. of Barnes Elms, Surry, for planting - - - - -	2	10	0
To Edward Buckworth Herne, Esq. of Heverland, Norfolk, for planting - - - - -	2	10	0
To Mr. John Simmons, of Preston, Kent, for planting - - - - -	2	10	0
To Mr. Francis Crump, of Battersea, Surry, for planting - - - - -	3	15	0
To Mr. Francis Butein, of Burchington, in the Isle of Thanet, for planting - - - - -	1	5	0
1765. To Mr. Francis Crump, of Battersea, Surry, for planting - - - - -	1	5	0
To Arthur Young, Esq. of Bradfield, Suffolk, for planting - - - - -	1	5	0
To the Rev. Mr. John Peele, of Tilney, Norfolk, for planting - - - - -	1	5	0
To Mr. John Simmons, of Preston, Kent, for planting - - - - -	2	10	0
To			

To Mr. George Payne, of Weybridge, Surry,	Acres.	£.	s.
for planting - - - -	2	10	0
To Mr. Joseph Flight, of Battersea, Surry, for			
planting - - - -	2	10	0
To Mr. John Harrison, of Preston, Kent, for			
planting - - - -	4	20	0
To Mr. John Thorp, of Thames Ditton, for			
planting - - - -	1	5	0
To William Hutchens, Esq. of Barnes, Surry,			
for planting - - - -	15	75	0
To Mr. John Suter, of Barnes, for planting	1	5	0
To the Rev. Mr. Berriah Brooke, of Ridge, Suffolk,			
for planting - - - -	1	5	0
To the Rev. Mr. John Baber, of Chesterford,			
Essex, for planting - - - -	1	5	0
To John Cook, Esq; of Tandridge, Surry, for			
planting - - - -	2	10	0
1767. To Mr. Joseph Talmin, of St. Leonard's,			
Bromley, for planting - - - -	1	5	0
To Arthur Young, Esq. of Bradfield, Suffolk, for			
planting - - - -	1	5	0
To Mr. Joseph Flight, of Battersea, Surry, for			
planting - - - -	15	75	0
To the Rev. Mr. Daniel Hill, of East Malden,			
Kent, for planting - - - -	1	5	0
To Mr. Thomas Giles, of Breadburn, Kent, for			
for planting - - - -	1	5	0
			To

To Messrs. Preble and Royle, of St. Mary's, Northgate, Canterbury, for planting	Acres.	£.	s.
	1	5	0
To Mr. James Johnson, of Great Shelfley, Worcestershire, for planting - -	1	5	0
To Mr. William Fairman, of Tonge, Kent, for planting - - - -	1	5	0
To Mr. Thomas Parsons, of Taunton, Somerset, for planting - - - -	1	5	0
To Mr. Jeremiah Giles, of St. Mary's, Canterbury - - - -	7	35	0
To Mr. Broome Wilts, of Chipping-Norton, Oxon, for planting - - - -	1	5	0
To Mr. John Harrison, of Preston, Kent, for planting - - - -	1	5	0
To Mr. John Dudlow, of St. Mary's, North- gate, Canterbury, for planting -	1	5	0
To William Hutchings, Esq. of Barnes, Surry, for planting - - - -	8	40	0
To Mr. Charles Row, of the Devizes, Wilts, for planting - - - -	2	10	0
To Mr. William White, of Ide, near Exeter, for planting - - - -	1	5	0
To Mr. John Lane, of Teynham, near Sittingbourn, Kent, for planting -	1½	7	10
1768. To Mr. Thomas Beavor, of Hithel, Norfolk, for planting - -	2	10	0
	X		To

	Acres.	£.	s.
To Mr. John Neame, of Birchington, in the Isle of Thanet, for planting -	1	5	0
To Mr. John Reynolds, of Adisham, Kent, for planting - - - -	4	20	0
To Mr. Joseph Flight, of Battersea, Surry, for planting - - - -	18	90	0
To Mr. Thomas Parsons, of Taunton, Somer- set, for planting - - - -	2	10	0
To Mr. Thomas Giles, of Breadburn, Kent, for planting - - - -	4	20	0
To Mr. Jeremiah Giles, of St. Mary's, Canterbury, for planting - -	7	35	0
To Mr. John Lane, of Teynham, near Sittingbourn, Kent, for planting -	1	5	0
To Mr. John Crow, of Feverham, Kent, for planting - - - -	2	10	0
To Mr. John Harrison, of Preston, Kent, for planting - - - -	13	65	0
To Mr. Charles Rose, of the Devizes, Wilts, for planting - - - -	2	10	0
To George Payne, Esq. of Weybridge, Surry, for planting - - - -	2	10	0
To Mr. John Dudlow, of Canterbury, for planting - - - -	3	15	0
To Mr. Thomas Giles, of Breadburn, Kent, for planting - - - -	3	15	0
To Mr. John Harrison, of Preston, Kent, for planting - - - -	6	30	0

C H A P. V.

Premiums and Bounties for raising H E M P.

1763.	T O Mr. Joseph Higgins, of Preston, Salop, for raising - - -	Acres.	£.
		35	40
	To Mr. John Elsmere, of the parishes of St. Julian and Pontisbury, Salop, for raising	19	30
	To Mr. * <i>Christopher Michell</i> , of Putford, Devon, for raising - - -	45	40
	To Mr. * <i>William Jones</i> , of Putford, Devon, for raising - - -	40	20
	To Mr. Giles Hawkins, of East Chinnock and West Coker, Somerset, for raising -	31	10
1764.	To Mr. Giles Hawkins, of West Coker, Somerset, for raising - - -	37	40
	To Mr. John Davy, of West Coker, Somerset, for raising - - -	15	30
	To Mr. William Preston, of Crowland and Whap- load Drove, Lincolnshire, for raising	10	20
			To

* The above premiums were paid to Dr. John Stephens.

	Acres.	£.
To Mr. Joseph Higgins, of Preston, Salop, for raifing - - - - -	18	30
To Mr. John Elsmere, of Shrewsbury, for raifing - - - - -	15	20
To Mr. Samuel Elsmere, of Almond-park, Salop, for raifing - - - - -	15	20
To John Woolmonton, Esq. for raifing -	14	20
To James Higgins, for raifing - -	66	40
To Mr. John Davy, of Yeovil and West Coker, Somerfet, for raifing - - - - -	43	30
To Mr. John Day, of West Coker, Somerfet, for raifing - - - - -	29	30
To Mr. Giles Hawkins, of East Chinnock and West Coker, Somerfet,	31	10

C H A P. VI.

Honorary and Pecuniary Premiums given for cultivating
B U R N E T.

1767. **T**O John Searancke, Esq. of Hatfield, in Hertfordshire, for sowing thirty-seven acres, twenty pounds; but Mr. Searancke, in preference to a pecuniary reward, accepted of a gold medal.

1764.

1764.	To Mr. Rocque, of Walham-green, for the improved culture of Burnet, a bounty of	£.	50
1765.	To Christopher Baldwin, Esq. of Clapham-common, Surry, for sowing sixteen acres in the parish of Battersea,	} —	15
	To the Rev. Mr. Davies Lamb, Rector of Ridley, near Dartford, Kent, for sowing eight acres,		
	To Mr. Richard Scrase, of Withdean, in the parish of Patcham, near Brighthelmstone, in Suffex, for sowing five acres,	} —	15
1766.	To Robert Barber, Esq. of Gover, near Exeter, Devon, for sowing upwards of ten acres in the parish of Whetstone,		

Premiums given for cultivating L U C E R N E.

1763.	To Humphry Sturt, Esq. for sowing seven acres,	£.	20
	To Colonel Edward Taylor, for sowing seven acres		15
1764.	To Mr. John Vallance, of Patcham, near Brighthelmstone, Suffex, for sowing thirteen acres,		20
	To Mr. James Bedel, of North Cray, Kent, for sowing twelve acres		15
	To Mr. James Edwards, third premium, for sowing Lucerne,		10

Premiums

Premiums given for cultivating C A R R O T S.

1763.	To Mr. * <i>John Darch</i> , of Brushford, Somersetshire, for sowing of Carrots,	- - -	£.
			15
	To Mr. Robert Billing, of Weafenham, All Saints, Norfolk, for sowing thirty acres,	- -	20
1764.	To Mr. Robert Billing, of Weafenham, All Saints, aforefaid, for sowing twenty-four acres and an half,		20
1765.	To Mr. Robert Billing, for sowing the like quantity of ground with Carrots,	- -	20

*Premiums given for cultivating TURNEP CABBAGE, and
TURNEP - ROOTED CABBAGE.*

1767.	To Robert Colville, Esq. of Newton, in the Isle of Ely, Cambridgeshire, for the culture of Turnep Cabbage,	} -	£.
			20
1769.	To Mr. John Reynolds, of Adisham, in Kent, for introducing the Turnep-rooted Cabbage, not heretofore made use of in this country, but more especially for his particular attention to promote the Views of the Society, a bounty of - -	} -	50

Premiums given for cultivating divers Kinds of G R A S S.

1764.	To John Freeman, Esq. of Chute-lodge, Wilts, for producing twenty-one hundreds, one quarter, and thirteen pounds, of White Clover feed, produced on his lands,	- -	£.
			20

* This premium was paid to Dr. John Stephens.

1765.	To Mr. Thomas Harker, of Sherfield-upon-Loddon, Hants, for one thousand and nine pounds of White Clover Seed, produced on fourteen acres,	—	20	0
1766.	To Mr. William Judge, of Widford, near Chelmsford, in Essex, for gathering the seed of Meadow Fox-tail, and Crested Dog's-tail, by the hand,	—	5	0
	To Mr. Edward Birch, of Stone Easton, near Wells, in Somersetshire, for gathering, in like manner, the seed of Crested Dog's tail,	—	5	0
	To Mr. William Goffe, of Ringwood, Hants, for gathering the seed of Crested Dog's-tail, by the hand	—	3	3
1767.	To Mr. Thomas Stacey, of Mitcham, Surry, for gathering the seed of Meadow-fescue by the hand,	—	10	0
	To Mr. William Goffe, of Ringwood, Hants, for two ounces of annual Poa seed,	—	2	2
	To Mr. William Goffe, of Ringwood, Hants, for gathering Vernal-grass seed by the hand, first premium,	—	10	0
	To Mr. William Black, of Wagher, Yorkshire, first premium, for gathering fine Bent,	—	10	0
	To the said William Black, first premium, for gathering Crested Dog's-tail,	—	10	0
	To Mr. James White, of Leigh-on-Mendip, Somersetshire, second premium, for gathering Crested Dog's-tail,	—	5	0

To

To Mr. William Goffe, of Ringwood, Hants, first	£.	s.
premium, for Meadow-fescue, - -	2	2
To Mr. William Goffe, part of the second		
premium, for fine Bent, - - -	2	2
1768. To Mr. Thomas Stacey, of Mitcham,	}	140 0
Surry, for sowing the following Grass seeds, viz.		
Meadow-fescue, Common Poa, Vernal Poa,		
Yellow Oat, Meadow Fox-tail, and Crested		
Dog's-tail, - - - -		

C H A P. VII.

Honorary Premiums given for STOCKS of BEE S.

	Stocks.	Medals.
1762. T O Mr. Thomas Faucet, of } Oxque, in Yorkshire, for } the greatest number of Stocks, being }	223	a gold medal.
To Mr. Thomas Slarke, for the second greatest number, being —	110	a silver medal.
1763. To Mr. Thomas Faucet, for	185	a gold medal.
To Mr. Thomas Slarke, for -	128	a silver medal.
1764. To Mr. Thomas Faucet, for	124	a gold medal.
To Mr. Thomas Haynes, of Oundle, Northamptonshire, for —	105	a silver medal.
1765. To Mr. Thomas Faucet, for	182	a gold medal.

Pecuniary

Pecuniary Premiums given for STOCKS of BEEES.

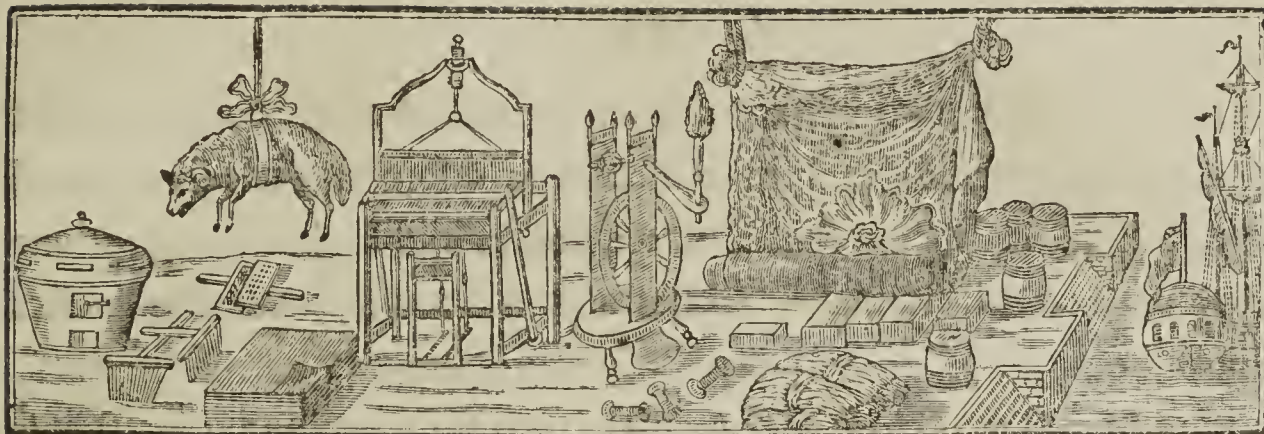
		Stocks.	£.
1764.	To Mr. Thomas Harvey, Yeoman, of Elmdon, Effex, for - - -	150	10
1765.	To Mr. William White, of Stretford, Oxon, for - - - - -	32	5
	To Mr. John Edmonds, of Rudston, Yorkshire, for -	38	5
	To Mr. Thomas Shovelar, of Bishopsbourn, Kent, for - - - - -	35	5
	To Mr. James Snelling, of Woking, Surry, for -	35	5
	To Mr. John Howard, of Woking, Surry, for -	32	5
	To Mrs. Mary Pitches, of Exning, Suffolk, for -	30	5
	To Mr. Thomas Faucet, of Oxque, Yorkshire, for -	122	5
	To Mr. Richard Jenifon, of Market-weighton, Yorkshire, for - - - - -	31	5
	To Mr. Robert Bruce, of Ford, Northumberland, for - - - - -	33	5
	To Mr. Jonathan Satchell, of Kettering, Northamptonshire, for - - - - -	39	5
	To Mr. John Short, of Chilbolton, Southamptonshire, for - - - - -	36	5
	To Mr. John Pendred, of Wellingborough, Northamptonshire, for - - - - -	42	5
	To Mr. William Gilbert, of Exning, Suffolk, for -	32	5
	To Mr. Thomas Slarke, of Sunning-hill, Berks, for -	78	5
	To Mr. Benjamin Harris, of Aston Tirrold, Berks, for -	30	5
	Y		To.

To Mr. Richard West, of South Reston, Lincoln-	Stocks.	£.
shire, for - - - - -	75	5
To Mr. Thomas Young, of Waltham Cross, Herts,		
for - - - - -	34	5
To Mr. Andrew Turner, of Elvetham, Hants, for	30	5
To Mr. John Winter, of Great Gonerly, Lincoln-		
shire, for - - - - -	30	5
To Mr. Peter Daley, of Woodbury, Devon, for -	45	5
To Mr. Nathaniel Cory, of Bugbrook, Northamp-		
tonshire, for - - - - -	30	5

Premiums and Bounties for BEE S WAX.

1765.	To Mr. Nathaniel Thorley, - - -	5
	To Mr. Andrew Turner, - - -	5
	To Mr. Joseph Pohles, - - -	5
	To Mr. Thomas Young, - - -	5
	To Mr. Peter Daley, - - -	5
	To Mr. Richard Jenifon, - - -	5
	To Mr. Frederick Barnard, - - -	5

E N D O F B O O K III.



B O O K IV.

M A N U F A C T U R E S ;

C O M P R E H E N D I N G

*Descriptions and Explanations of such of the Society's
Machines and Models, in Manufactures, as are
represented in the Copper-plates hereunto annexed.*

C H A P. I.

A Description of Mr. UNWIN'S STOCKING-FRAME.

PLATE I. FIG. I. *A perspective View of the MACHINE.*

A, A, **T**WO Standards or Posts, two feet and an half long,
and three inches square ; on the upper ends of
these Posts are fastened two brackets, and a seat for the hosier to
sit on.

B, B,

B, B, The two principal Standards or Posts, on which the machine is erected, and to which it is fastened with screws and nuts. These Posts are four feet, ten inches and an half long; their extreme breadth is eleven inches and a quarter, and two inches thick.

C, C, Two Side Rails, mortised into the four standards. These Rails are each eighteen inches and three quarters long, exclusive of their tenons; four inches and an half broad, and two inches thick.

D, D, Two Brackets, fastened to the short posts A, A, to support the hofier's seat k.

E, E, Two cross Rails, mortised into the under ends of the posts or standards A, A, and B, B. The front Rail is eighteen inches long, exclusive of its tenons; three inches and three quarters broad, and two inches and three quarters thick. The back Rail is twenty inches and two-twelfths long, exclusive of its tenons; three inches and a quarter broad, and two inches and a quarter thick.

F, A Gage-frame, consisting of four short posts, mortised into the fore-rail E, and capped with a piece of wood nine inches and eight-tenths long, and three inches and a quarter broad; its upper surface is thirteen inches and an half above the bottoms of the standards A, A. Each of these four short posts is four inches and an half long, three inches broad, and eight-tenths of an inch thick. This Gage-frame contains three treadles, whose fulcrum, or round iron spindle, passes through their fore ends, which are guided by the four short posts before-mentioned.

G, G, G,

G, G, G, Three Treadles, the two outermost of which are alternately forced down, by the feet of the hofier, to give a retrograde motion to the slur-wheel K, the slur-box R, &c. to which they are connected by the cords b, b, and d, d. The middle Treadle is connected to the under balance-frame H f, and the presser-bar Y Y, by the jointed rods g, g, a, i, i, and c, c. This Treadle gives motion to the linkers, stay-frames, &c. by means of the rods c, c, connected to the jointed rods g, g. See Fig. 2.

H, The under Balance-frame, whose iron fulcrums f, f, or centers of motion, pass through the arms of the said Balance-frame and the posts B, B, to which the center-pins f, f, are fastened with screws and nuts. N. B. Only one of these pins is seen in this view of the machine.

I, I, Two wooden Rails, one in the back, the other in the front; in the latter there are two drawers to keep small tools. The front Rail is twenty inches and a quarter long, exclusive of its tenons; three inches and two-twelfths broad, and two inches and a quarter thick. The back Rail is twenty inches and a quarter long, three inches and a quarter broad, and two inches and one-twelfth thick. Both these Rails are mortised into the posts B, B; each of them having an iron plate screwed to their sides, in which the spindle of the slur-wheel K, turns. N. B. The front Rail and one of the iron plates, only, are seen in this view of the machine.

K, The Slur-wheel, is seventeen inches diameter, and one inch thick, with a deep groove on its periphery to receive the slur-lines d, d: on the inside of this Wheel, there is a grooved pulley
for

for the treadle-cords b, b. This Slur-wheel is supported by its spindle or axis, in the iron plates affixed to the rails I, I.

L, The Axis of the Caster-backs.

M, The Lever, or Handle, of the Caster-backs.

N, The Needles.

O, The Jacks.

P, The Falling-bar.

Q, The front Slay-bar.

R, The Slur-box and Slur-bar. See Fig. 2. Plate II.

S, S, The Star-screws, by which the falling-bar P, is raised or depressed.

T, T, The Slur-pullies, Slur-bar, &c. See Fig. 2, 3, and 4.

V, V, Two Springs, fastened to the perpendicular plates of the finker and falling-bar frame. These Springs serve to fix the star-screws, when the falling-bar P, is set to its proper height.

UU, The Locking-bar, which receives the shoulders of the jacks, and raises them up, when they have been forced down by the slur-box R, &c. See Fig. 2 and 3.

W, W, Two Iron Plates, with a hole in each of them for the hooks and chains connected to the caster-backs, &c. See Fig. 2 and 3.

X, X, Two fixed Iron Plates, in each of which there is a long mortise and screw to regulate the depth of the jacks, &c. See Fig. 2 and 3.

YY, The Presser-bar. See Fig. 2 and 3.

Z, Z, The Sinkers. See Fig. 2.

a, An Iron Rod, connected to the balance-frame, middle treadle, pulley w, &c. See Fig. 2 and 4.

b, b, Two Cords, fastened to the two outermost treadles, and the groove pulley x, on the inside of the flur-wheel K. See Fig. 2. and 4.

c, c, Two Iron Rods, connected to the finker-bar, flay-frame, and the arms of the balance-frame H, &c.

d, d, The Slur-lines. See Fig. 2 and 3.

e, e, Two semicircular Arms, or Web-hooks, to which the hose is fastened.

f, f, Two Iron Bolts, or Center Pins, with which the balance-frame H, is connected to the principal posts B, P. N. B. Only one of these Pins is seen in this view of the machine.

g, g, Two jointed Iron Rods, to which the flat rods i, i, are fastened with round-headed iron pins. These Rods are connected to the middle treadle, flay-frame, and preffer-bar, as before-mentioned.

h, h, Two Iron Plates, (fixed to the wooden rails I, I,) in which the spindle of the flur-wheel K, turns. Only one of these Iron Plates are seen in this view, the other being fastened to the back rail, represented in Fig. 4.

i, i, The Iron Rods, of the preffer-bar, &c. are flatted at their upper ends, to which the preffer-bar Y Y, is fastened with two round-headed screws. See Fig. 2.

k, The Seat, on which the hofier sits to work, is two feet long, nine inches and an half broad, and seven-eighths of an inch thick.

l, l,

l, l, Two moveable Iron Staples, to steady the ends of the falling-bar P.

m, m, Two Iron Staples, driven into the rail I, to guide and steady the rods i, i.

n, n, &c. Four Screws and Nuts, (on each side of the frame) by which the machine is fastened to the posts B, B. See Fig. 2, 3, and 4.

o, o, Two Iron Rollers, which sustain the leather straps hereafter mentioned. See Fig. 2. 3. and 4.

P L A T E II. F I G. II.

A, A, The upper Ends of the two Standards or Posts, which support the feet k.

B, B, The upper Ends of the two principal Standards or Posts, on which the machine is erected, and fastened with screws and nuts.

I, The front Wooden Rail, mortised into the standards B, B. See description of Plate I.

K, The Slur-wheel, described in Plate I.

L, The Axis of the caster-backs.

M, The Handle, or Lever, of the caster-backs.

N, The Needles.

O, The Jacks.

P, The Falling-bar.

Q, The front Slay-bar.

R, The Slur-box, and Slur-bar.

S, S,

S, S, Two Star-screws, by which the falling-bar P, &c. is raised or lowered.

T, T, Two Slur-pulleys, and Pulley-frames. See Fig. 3. and 4.

V, V, Two Springs, fastened to the perpendicular plates of the flay-bar frame, &c. See description of V, Plate I.

UU, The Locking-bar. See description of Plate I.

W, W, Two Plates of Iron, described in Plate I.

X, X, Two fixed Iron Plates. See description of Plate I.

Y Y, The Preffer-bar.

Z, Z, The Sinkers.

a, An Iron Rod, connected to the balance-frame. See description of Plate I.

b, b, Two Cords, fastened to the two outer treadles, and to the grooved pulley on the inside of the slur-wheel K.

c, c, Two iron rods, connected to the flay-frame, &c. See the description of Plate I.

d, d, &c. The Slur-lines.

e, e, Two femicircular Arms, or Web-hooks, to which the hofe are fastened.

g, g, Two jointed Iron Rods.

h, The two Iron Plates, which sustain the slur-wheel, &c.

i, i, The Rods of the preffer-frame. See description of Plate I.

k, The Seat on which the hofier fits.

l, l, Two moveable Iron Staples, to steady the ends of the falling-bar P.

Z

m, m,

m, m, Two Iron Staples, fixed in the front rail I, to direct the rods i, i.

n, n, n, n, Four Screws and Nuts, by which the machine is fastened to the posts B, B.

o, o, Two Iron Rollers, which sustain the leather straps. See Fig. 3.

q, q, Two Pieces of flat Iron, whose upper ends turn horizontally at right angles with their perpendicular faces; and, like tenons, pass through an aperture in each end of the front flay-bar Q, to which, and the back flay-bar U, they are fastened with screws and nuts, leaving a space between the two said bars, for the Jacks to move freely up and down. See Fig. 3.

P L A T E III. F I G. 3.

B, B, The upper Ends of the two principal Posts or Standards, on which the machine is erected. See description of Fig. 1. and 2.

K, Part of the Slur-wheel.

L, The Axis of the Caster-backs.

R, The Slur-box, and Slur-bar.

S, S, The Star-screws. See description of Fig. 1. and 2.

T, T, The Slur-pullies, Slur-bar, &c.

U, U, The Locking-bar. See description of Plate I.

W, W, Two Plates of Iron. See description of Plate I.

X, X,

X, X, Two fixed Iron Plates. See their use in description of Plate I.

Y Y, The Preffer-bar.

c, c, Two Iron Rods. See description of Plate I.

d, d, Part of the Slur-lines. See Fig. 1 and 2.

i, i, Part of the Iron Rods of the preffer-bar. See description of Plate I.

n, n, &c. Screws and Nuts. See their use in description of Plate I.

o, o, Two Iron Rollers, by which the leather straps p, p, are supported.

p, p, Two Leather Straps, with which the rods i, i, the flay-frame, &c. are connected.

q, q, See description of Plate II.

r, r, The Spring-stock, or Piece of Wood, into which the sinker-springs are fastened.

s, s, The Joints of the cafter-backs.

t, The Sinker-springs.

u, The back Slay-bar.

P L A T E III. F I G. 4.

B, B, The Tops of the two principal Posts, which support the machine. See description of Plate I.

I, The back Wooden Rail. See description of Plate I.

K, The Slur-wheel, with a view of the groove on its periphery. See description of Plate I.

L,

- L, The Axis of the caster-backs.
 O, The Jacks.
 R, The Slur-box, &c.
 S, S, The two Star-screws. See their use in description of Plate I.
 T, T, The Slur-pullies.
 n, n, &c. Screws and Nuts. See description of Plate I.
 p, p, Two Leather Straps. See their use in description of Fig. 3.
 r, r, The Spring-stock. See the description of Fig. 3.
 s, s, The Joints of the caster-backs.
 t, The Sinker-springs.
 v, v, Four Friction-rollers, connected to the slur-box, which they guide and steady in its motion forward and backward along the slur-bar: two of these Rollers are placed under the slur-bar, but are not seen in this view. See Fig. 2.
 w, The Pulley, Leather Strap, and Iron Rod, with which the middle treadle is connected to the balance-frame, &c.
 x, A Pulley, fixed on the axis of the slur-wheel K, and is actuated by the outer treadles G, G, and the lines b, b.

This Machine was examined by several reputable Hofiers, and worked in presence of the Committee of Manufacturers, who recommended to the Society to give Mr. UNWIN the sum of eighty pounds, part of the Premium of one hundred pounds; and a farther sum of twenty pounds, if he sent a complete frame of the same construction, to be left in the Society's Repository of Manufactures. This Resolution of the Committee was agreed to, February 14, 1765.

C H A P. II.

Description and Explanation of Mr. ALMOND'S LOOM.

P L A T E I. F I G. I.

A Geometrical Elevation of the Front of the LOOM.

A, A, A, A, **T**H E four Legs of the chair, or seat, two of which Legs are fastened to the upper edge of the under rail L, in the front of the loom.

B, A round-headed Iron Rod, which passes through the legs of the chair, and is fastened thereto with an Iron wedge, or key, driven through an aperture in the end of the rod.

C, C, C, Three Wooden Cylinders, with a hole in each of them for the iron rod to pass through: their use is to keep the treadles at a proper distance from each other.

D, D, Two Treadles, each three feet five inches long, one inch and an half broad, and one inch and a quarter thick at their center ends, and one inch in diameter at their points. These Treadles move in an oblique direction, their center ends being two inches and an half distant from each other, and their points, or inner ends, six inches (inside measure) from each other. The iron rod B passes loosely through the center or fore ends of the treadles, and is the fulcrum on which they move.

E, E,

E, E, The under Jacks, are each three inches long, one inch and a quarter broad, and three quarters of an inch thick. Their upper ends turn on an iron pin, with which they are connected to the under lams.

F, F, The Skippers, are each eleven inches long, one inch broad, and three-eighths of an inch thick. These Skippers are connected to the treadles, lams, and harneffes, with wooden jacks and cords, as represented in Fig. 1. &c.

G, G, G, G, The upper Jacks, are connected to the lams, harneffes, &c. as before-mentioned; but there are only three of them seen in this view of the loom, the other being behind the middle jack.

H, H, The two front Posts of the loom, are two feet nine inches and an half long, (exclusive of their tenons) three inches and an half broad, and one inch and three quarters thick.

I, I, The Swords of the Batten, are each three feet, two inches and an half long, (from out to out) three inches and an half broad, and three quarters of an inch thick; and, as their fulcrum, or center of motion, is fixed at the bottom of the frame, it is much less liable to vibrate than any common loom.

K, K, Two Cleats, or Pieces of Wood, each one foot long, two inches and an half broad, and two inches and a quarter thick, with an aperture, or long mortise, through which the under ends of the batten-fwords are inserted, and set to a proper degree of inclination, &c. with a round iron pin, or fulcrum, which is occasionally shifted from one hole to the other, in the cleats and fwords of the batten. See K, Fig. 3.

L,

L, The under Rail, in the front of the loom, is two feet nine inches long, from shoulder to shoulder of its tenons, four inches broad, and two inches thick. The fore legs of the chair, or seat, A A, &c. are fastened to the upper edge of this Rail, as before-mentioned.

M, The Cloth-beam, or Roller, is two feet eight inches long, and three inches and an half in diameter.

N, The Breast-beam, is three feet four inches long, four inches broad, two inches and an half on the back edge, and two inches on the fore edge, with an aperture in its front, through which the cloth is conveyed to the beam or cloth roller M.

O, The Hand-rail, or Cap of the Batten, is three feet four inches long, one inch and an half broad, and nine inches and a quarter thick, with a groove on its under side to receive the flay, or reed, and a mortise at each end of it, properly fitted to the upper ends of the batten-words.

P, The Harness, with its upper Stave, &c.

Q, The Tug Lines, properly fitted to the pullies and harness staves.

R, R, Two Wooden Pullies and Pins, which carry the tug lines of the harness, &c. These Pullies are let into a notched piece of wood, suspended to an iron frame.

S, The Iron Frame, to which the notched piece of wood with the pullies are suspended. The perpendicular and curved arms of the Iron Frame are half an inch square, and their under ends are driven, like tenons, into the mortises in the side rails of the loom. See Fig. 3. The dimensions of their under ends are
one

one inch and a quarter broad, and three-eighths of an inch thick, with small shoulders projecting over their edges, &c. See Plate III.

T, A Bobbin, or Spull, with yarn to mend the broken threads of the web.

V, A grooved Wheel, seven inches in diameter, and one inch and an half broad on its periphery ; this Wheel is fastened to the end of the cloth beam, having two circumvolutions of cord round its periphery ; one end of the cord is fastened to the under rail L, in the front of the loom, and at the other end is suspended the dead weight Z. This weight serves to draw forward the web, when the iron trigger or click of the ratchet-wheel X, is lifted up with the foot on the cord Y.

U, U, The Ends of the under Batten, mortised into the fwords I, I.

W, W, Two Flat-shaws, seven inches diameter, fastened to the ends of the yarn-beam, to keep the lift of the web true and even on the beam, as represented in Plate II.

X, A Ratchet-wheel, fastened to the end of the yarn beam.

Y, A Cord fastened to the end of the iron trigger or click of the ratchet-wheel, and to the under rail L, in the front of the loom.

Z, A Dead-weight, suspended to the end of a cord wound twice round the grooved wheel V, and fastened to the rail L, in the front of the loom. This Weight, as before-mentioned, serves to draw the web forwards, when the iron triggers or clicks of the ratchet-wheels are lifted up with the cords Y, Z.

P L A T E

P L A T E II. F I G. 2.

A Geometrical Elevation of the LOOM, taken from the back side thereof.

- A, A, The fore Legs of the Chair.
 B, The Iron Rod.
 C, C, C, The Wooden Cylinders.
 D, D, The Treadles to the fore legs of the chair.
 E, E, The under Jacks.
 F, F, The Skippers.
 G, G, &c. The upper Jacks.
 I, I, The Swords of the Batten.
 K, K, Two Cleats, or Pieces of Wood, with long mortises to receive the swords of the batten.
 M, The Cloth-beam.
 N, N, The Ends of the Breast-beam.
 O, O, The Ends of the Hand-rail, or Cap of the Batten.
 P, The Harness, with its upper staves, &c.
 Q, The Tug-lines.
 R, R, Two Wooden Pullies and Pins, &c.
 S, The curved Iron Frame, with the Pullies, &c.
 T, The Ends of the Bobbin-frame. See Fig. 1.
 V, The Grooved Wheel, which carries the dead-weight.
 U, U, The ends of the under Batten.

A a

W, W,

W, W, Two Flat-shaws, on the ends of the yarn-beam.

X, A Ratchet wheel, fastened to the end of the yarn-beam.

Z, The Dead-weight, and loofe Cord, fastened to the end of the click of the ratchet-wheel X, at the end of the cloth-beam M.

a, The under Rail, at the back of the loom, is two feet nine inches long, (exclusive of its tenons) four inches broad, and two inches thick.

b, b, The two back Posts of the loom, are each three feet two inches and three quarters long, three inches and an half broad, and one inch and three quarters thick.

c, c, The Counter-mashes, are each two feet five inches long, one inch broad at their back or center ends, five-eighths of an inch broad at their points or fore ends, and half an inch thick.

d, The Yarn-roller, or Beam, with its flat-shaws and ratchet-wheels.

e, The upper Rail, at the back of the loom, is two feet nine inches long, (exclusive of its tenons) two inches and an half broad, and two inches thick ; the upper end of this Rail is fixed one inch and an half higher than the breast-beam, and nine inches above the center of the yarn-roller, or beam.

f, The Spindle of the Yarn-beam, or Roller.

N. B. If there was a roller for the web to bear on, instead of this rail, there would be much less friction to the yarn, than there is by its bearing on a fixed rail. By the application of this bearing rail, or roller, the following advantages are obtained ; viz.

I. The web is raised to a proper height, to keep the upper shades, or bosoms, somewhat flacker than the under ; by which
means

means it cloaths better than when the shades are both of an equal tension.

- II. By raising the web behind the harness, the broken threads are much easier come at, than when the web is level with the breast-beam.
- III. By fixing the Yarn-beam under this Bearing-rail, or Roller, the web is at all times kept exactly in the same position ; but when the web (as in the usual way) is worked off from the Yarn-beam, its height, inclination, and distant from the breast-beam, are varying at every revolution of the Yarn-beam, or Roller.
- IV. The generality of looms for weaving plain woollen cloth, have their Yarn-beams, or Rollers, fixed so near to the harness, that, notwithstanding the flexibility of woollen yarn, the threads of the web are frequently broken in opening the shade wide enough for the shuttle to pass through ; and, as they often break on the Yarn-beam, the weaver is obliged, when it so happens, to go out of his loom to tie the broken pieces of yarn, which are commonly very difficult to be found, especially when the web is badly rolled up round the Beam.

These defects are in a great measure removed by the application of the before-mentioned Rail, or Bearing-roller, and by fixing the Yarn-beam at a proper distance therefrom ; by which means there will be a greater length of web between the harness and Yarn-beam ; consequently, it will stretch and yield more freely to the expansion

panfion of the fhade ; and at the fame time be lefs liable to break the threads of the web on the Beam, by the diminution of the tenfion between the Bearing-rail and the Yarn-beam.

P L A T E III. F I G. 3.

A perspective View of the L O O M.

- A, The Chair.
- B, The round-headed Iron Bolt.
- D, The Treadles.
- E, The under Jacks.
- F, The Skippers.
- G, The upper Jacks.
- H, H, The two front Posts.
- I, I, The Swords of the Batten.
- K, A Wooden Cleat, in which the fword is inferted.
- L, The under Rail, in the front of the loom.
- M, The Cloth-beam, indicated by dotted lines.
- N, The Breaft-beam.
- O, The Hand-rail, or Cap of the Batten.
- P, The Harnefs.
- Q, The Tug-lines.
- R, R, The Pullies.
- S, The curved Iron Frame, which fufains the harnefs, &c.
- T, The Bobbin.
- V, The Grooved Wheel and Ratchet (not feen in this view.)
- U,

U, The under Batten, mortised into the Swords II.

W, W, The Flat-shaws, &c.

X, The Ratchet-wheel, and Click of the Yarn-beam d.

Y, The Cord fastened to the click of the ratchet-wheel of the yarn-beam.

Z, The Dead-weight, and loose Cord, fastened to the click of the cloth-beam.

a, The under Rail at the back of the loom.

b, b, The two back Posts of the loom.

c, c, The Counter-mashes.

d, The Yarn-beam, with its flat-shaws, ratchet-wheel, trigger, and winch to turn up the web on the yarn-beam.

e, The upper Rail, at the back of the loom.

f, The Iron Spindle of the Yarn-beam, with its Winch, with which the yarn is wound up on the beam or roller.

This Loom was invented by Mr. JOHN ALMOND, of Great Easton, in Leicestershire, and by him produced to the Society, who appointed the Committee of Manufactures to examine all its Parts and Movements; which were minutely examined, explained and worked, by the Inventor, in presence of the said Committee and several skilful Manufacturers, who were fully convinced of its utility; it was therefore the opinion of the Committee, that Mr. ALMOND's Loom is an ingenious and useful Invention, and deserving of the Encouragement of the Society.

Resolved to recommend to the Society to give Mr. ALMOND a Bounty of fifty Guineas for his new invented Loom, he leaving the same with the Society for the Use of the Public: to which Resolution of the Committee the Society agreed January 9, 1771.

C H A P. III.

*A Description and Explanation of an ITALIAN-REEL
procured by a Worthy Member of the Society.*FIG. 1. *A perspective View of the REEL.*A, **T**HE Stand, or Frame of the Reel.

B, B, &c. The Bearing-bars, or Rails, of the Reel, each two feet long, one inch and seven-eighths of an inch broad, and one inch and a quarter thick, bevelled on each of their upper sides to an acute angle, leaving their upper or bearing edges smooth and round, about the thickness of a crow-quill. These Rails are one foot eight inches and an half distant from each other.

C, C, C, C, The Arms of the Reel, are fixed at right angles to their axis, and each of them ten inches and seven-eighths of an inch long, one inch and an half broad, and one inch and a quarter thick. These Arms are inserted into D, the axis of the Reel, and fastened thereto with wooden wedges. Two of the Arms, with their bearing-bar, are dove-tailed together, and are taken out occasionally, when the filk is to be taken off the Reel; and fastened together again with four wooden pins (as represented in Fig. 1. and 2.) when the filk is to be wound off the cocoons.

D,

D, The Axis of the Reel, two feet one inch long, from shoulder to shoulder, and three inches square at that part where the arms pass through the Axis.

E, A Vertical Pulley, six inches diameter, and one inch and a quarter thick. This Pulley is fastened to the inner end of the axis D, and revolves with it ; carrying a band, or line, which is connected to the horizontal pulley F.

F, An Horizontal Pulley, nine inches and an half in diameter, and one inch and a quarter thick. This Pulley revolves round a flat-headed wood-screw, three-eighths of an inch thick, with which it is fastened to the sliding-block H ; the use of which block is shewn in Fig. 2.

G, A sliding Valve, or Regulator, which acts as a crank, and runs in two grooved pieces of wood, fastened to the upper surface of the horizontal pulley. The use of this sliding Valve is to extend, or shorten, the radius of the crank, by setting the pin of the Valve farther or nearer to the center of the horizontal pulley, by moving, occasionally, the pin in the holes of the upper surface of the valve.

H, A sliding Block, two inches and seven-eighths broad, and two inches thick ; on each side of this Block, there is a rib or ledge one-sixth of an inch square, which runs in a groove, or rabbet, in each side of the box I, on the top of the pillar M, and in the same manner as the ribs of the sliding valve G. The use of this sliding Block is to keep the band, or line, to a certain degree of tension, by means of the weight-line and pulley K.

I, A Box, ten inches long, four inches and a quarter broad,
and

and three inches deep, supported on the pillar M. In each side of this Box, there is a groove for the ribs of the sliding block H, to run in, as before-mentioned.

K, A Weight, about seven pounds, (suspended to a line and pulley) more or less, according to the friction of the sliding block H, and the thickness of the band, which is kept at a proper degree of tension by this weight.

L, A Guide-stick, or Directing Rod, with two wires rivetted thereto, projecting five inches and an half above it; each wire has a small ring, or helix, as represented in Fig. 1. and 2. The silk threads passing through these rings, or helixes, are laid obliquely on the bars of the reel, by means of the progressive and regressive motion of the Guide-stick; at the end of which Stick, there is a hole to receive the iron pin in the end of the sliding valve G.

M, A Pillar, ten inches long, (including its plinth) and three inches diameter, mortised into the rail N, distant nine inches from its fore end.

N, The back Rail of the Frame: its extreme length is six feet three inches and an half, four inches broad, and three inches thick.

O, The fore Rail, is of the same dimensions as the rail N.

P, The Font-post, is one foot four inches long from the shoulder of the tenon, three inches broad, and one inch and an half thick: through the head of this Post is pierced an oval hole, parallel with the upper surface of the sliding valve, or regulator G.

Q,

Q, The back Post, is one foot six inches long from the shoulder of the tenon, three inches and an half broad, and one inch and a quarter thick. On the upper end of this Post, there is a jaw, or aperture, to receive the spindle of the axis D, to which spindle the pulley E is fastened with an iron pin, which passes through the upper end of the Post, to keep the axis from rising out of its place.

R, A Post of the same dimensions, and for the same purpose as the post Q.

S, S, S, S, Four Transoms, each one foot nine inches and three quarters long, from shoulder to shoulder ; and of the same breadth and thickness as the two rails N, O, into which they are mortised.

T, T, T, T, Four Standards, or Legs, of the Frame ; each one foot ten inches long, four inches broad, and three thick.

V, The Stove, or Fire-place, is three feet long, two feet five inches and an half thick, and one foot ten inches high.

W, An oval Copper Pan, one foot eight inches long, one foot four inches and an half broad, and half an inch deep. This Pan is kept supplied with water scalding hot, if the cocoons are very hard ; but, if they are soft, a less degree of heat will be sufficient for the cocoons to be immersed in, whilst the silk is winding therefrom.

X, An Iron Plate, two feet two inches long, one inch and an half broad, and one-eighth of an inch thick ; perforated with holes for the silk to pass through : at each end of this Iron Plate,

B b

there

there is a shank, which is driven into the two fore ends of the rails N, O.

Y, An Iron Funnel, to carry off the smoke.

Z, A Winch, with which the reel is turned : its radius is five inches.

F I G. 2.

F, The Horizontal Pulley, drawn to a large scale to make it the more expressive.

G, The sliding Valve, or Regulator.

H, The sliding Block ; whose dimensions are indicated by the dotted lines.

I, The Box, which contains the sliding block.

K, The Weight-line, &c.

L, The Guide-stick, &c.

M, The Pillar, which supports the box, &c.

C H A P. IV.

*A Description and Explanation of the ITALIAN SILK-REEL ;
to which is added Mr. VERRIOR'S Method of laying the Silk
Obliquely thereon.*

A, A Perspective view of the Reel, with all its parts
and movements put together.

B, B, &c.

B, B, &c. The Bearing-bars or Rails of the Reel, each two feet long, one inch and seven-eighths of an inch broad, and one inch and a quarter thick ; their upper sides are bevelled off to an acute angle, leaving their upper or bearing edges smooth and round, about the thickness of a crow quill. These Rails are one foot eight inches and an half distant from each other.

C, C, C, C, The Arms of the Reel, are fixed at right angles to their axis, and are each of them ten inches and seven-eighths of an inch long, one inch and an half broad, and one inch and a quarter thick. These Arms are inserted into D, the axis of the reel, and fastened thereto with wooden wedges : two of the Arms, with their bearing-rails, are dove-tailed together, and are taken out, occasionally, when the silk is to be taken off the reel ; and fastened together again with four wooden pins, (as represented in Fig 1. and 2.) when the silk is to be wound off from the cocoons.

D, The Axis of the Reel, is two feet one inch long, from shoulder to shoulder, and three inches square at that part where the arms pass through. The spindles of the Axis revolve in two apertures, or jaws, in the upper ends of the posts G, H, through which are inserted two wooden pins to prevent the Axis from rising up.

E, F, G, H, Four Posts, eighteen inches long, including their tenons ; the Post E is two inches broad, and one and an half thick ; F is two inches and an half square ; G and H are three inches broad, and two thick. These Posts are mortised into the rails a, a.

I,

I, An escew Wheel, two inches and an half in diameter, (represented in Fig. 3.) under the axis of the endless screw V. This Wheel, and the crown wheel K, are both on the same axis, and are actuated by the endless screw before-mentioned.

K, A Crown Wheel, whose teeth are made with four wooden pegs driven into the end of the axis; which axis turns on a spindle at one end, and on the periphery of the Crown Wheel at the other end. See Fig. 3.

L, A Wooden Rack, fourteen inches long, three quarters of an inch thick, and five-eighths and one-sixteenth broad; with nine teeth, projecting half an inch from one of its sides: on its other side, there is a rib, or rabbet, fourteen inches and three quarters long, and a quarter of an inch square. See Fig. 5. This Rack passes freely through the under aperture in the post E, carrying with it the sliding rail M, (with its directing wires, cleat, &c.) which Rail, &c. passes through the upper aperture in the post E: in the edge of this post there is a round hole, or socket, wherein the axis of the crown wheel K turns, and gives motion to the rack. See Fig. 3. and 6.

M, The sliding Rail, is two feet ten inches and three quarters long, two inches and three quarters broad, and five-eighths of an inch thick. This Rail, with its directing wires, cleat, and wooden spring, are connected to the rack by an iron center-pin passing through the cleat and end of the rack. See Fig. 6.

N, The Cleat, with its wooden spring. The Cleat is five inches long, two inches and three quarters broad, and three quarters

quarters of an inch thick, fastened to the sliding rail M. See Fig. 6. At the lower end of this Cleat, the rack is fastened with an iron center-pin ; and, being thus connected to the sliding rail, communicates its reciprocal motion thereto, by acting, alternately, on the upper and under radius of the crown wheel.

O, A Spring, made of ash, fir, or some other elastic piece of wood, four inches long, five-eighths of an inch broad, and one-eighth of an inch thick. This Spring is fastened to the end of the rack. See Fig. 6.

P, A fixed Rail, or Traverse, two inches and three quarters broad, and three quarters of an inch thick, (see Fig. 6.) fastened with wood-screws to the two posts E and F, in Fig. 1. On the under side of this Rail is a notch, cut exactly of such a length, that its shoulders may, alternately, embrace the point, or upper end, of the wooden spring : by this means, the toothed end of the rack is forced up and down, so as to act, alternately, on the upper and under radius of the crown wheel, as before-mentioned.

Q, A Section of the Rack, on whose inner side is a rib, or bearer, four inches and three quarters long, and a quarter of an inch square. This rib bears on a cleat, or small piece of wood, fastened to the side of the aperture in the post E ; (See R, Fig. 4.) this cleat sustains the Rack, when it is actuated by the upper radius of the crown wheel ; but when it is put in motion by the under radius, the rib of the Rack passes under the cleat in the aperture of the post E. See R, Fig. 4. and 5.

R, The Cleat, or Bearer, is two inches and an half long, and a quarter of an inch thick, on which the rib of the rack is supported,

supported, when the upper radius of the crown wheel moves the rack ; but passes without touching it, when the rack is moved by the under part thereof.

S, S, A Section of the two moveable Arms and Rails of the Reel, dove-tailed, and fastened together with two wooden pins. See Fig. 2.

T, The Winch of the Reel, whose radius is five inches and an half.

V, An endless Screw, at the inner end of the axis of the reel, two inches and a quarter in diameter ; having a treble thread, or worm, which gives motion to the escew wheel I.

W, The Stove, or Fire-place, three feet long, two feet five inches and an half thick, and one foot ten inches high.

X, An oval Copper Pan, one foot eight inches long, one foot four inches and an half broad, and seven inches and an half deep. This Pan is kept supplied with water scalding hot, if the cocoons are very hard ; but if they are soft, a less degree of heat will be sufficient for the cocoons to be immersed in, whilst the filk is winding therefrom.

Y, An Iron Plate, two feet two inches long, and one-eighth of an inch thick, perforated with holes for the filk to pass through : at each end of this Iron Plate there is a shank driven into the ends of the rails a, a.

Z, Z, Z, Z, Four Standards, or Legs, of the frame, each one foot ten inches long, four inches broad, and three inches thick.

a, a,

a, a, The two Rails of the Frame : their extreme length is six feet three inches and an half ; breadth, four inches ; and thicknefs, three inches.

b, b, b, b, Four Tranfoms, each one foot nine inches and three quarters long, from fhoulder to fhoulder ; and of the fame breadth and thicknefs as the two rails a, a.

The Committee of Manufactures recommended this new-invented Reel, as worthy a Bounty of Forty Pounds ; and the Society agreed to this Refolution of the Committee, June 14, 1762.

E N D O F B O O K IV.

B O O K V.
M A N U F A C T U R E S ;

COMPREHENDING

*Short Descriptions of the Machines and Models in the
Society's Repository of Manufactures, not yet de-
lineated.*

C H A P. I.

*A short Description of Mr. SAMUEL HAYWARD'S new-invented
COMB-POT, for Combing Wool.*

AS the Society has been always very attentive and ready to encourage useful Discoveries and Inventions, particularly such as relate to Manufactures and Commerce, the joint Committees of Manufactures and Mechanics, were appointed to examine, very minutely, the new-invented Comb-pot, produced by Mr. Hayward ;

Hayward; and, as there appeared to be several considerable improvements made to this useful Instrument, the Committee was extremely deliberate and circumspect in their examination of it; and, after several Meetings and Consultations with People of Experience and Judgment in this matter, it was concluded that the following Advantages will accrue from it; viz.

I. That a fire made in this Comb-pot, either with sea coals, turf, or wood, will as effectually answer the purpose of combing wool, as charcoal; by which a considerable saving may be made in the expence of fuel.

II. This very essential operation in manufacturing wool is totally neglected in many towns and villages in this kingdom, either for want of charcoal, or on account of the great expence and difficulty in procuring it; it was therefore thought very probable, that when this useful discovery is made public, it will be the means of extending this and all other branches of the woollen manufacture in this kingdom.

III. That the combs are not fouled, or corroded, with smoke, foot, and sulphur, as they are at every heat; (which is about six hundred times a day in common Comb-pots) neither is the wool feared, shrivelled, or smutted, by the excessive heat and foulness of the combs, as it frequently is by the method now in practice.

IV. That by the application of two concave iron plates, funnel, &c. a greater degree of heat is conveyed to the under pitch of the combs, and the sharp and tender points of the broaches are defended from the flame and extreme heat, which, in common Comb-pots, for want of such a contrivance, are fre-

quently heated red-hot, burnt and bent in many places, to the great prejudice of the combs and the wool.

V. That by this method of conveying a regular and proper degree of heat to the combs, the colour of the wool is preserved, its curled and entangled fibres drawn out to a greater extent, and its staple, by that means, considerably lengthened.

VI. That this improvement of the Comb-pot will be the means of preserving the health and lives of many thousand wool-combers, who, by the method now in use, are daily breathing the destructive fumes of charcoal, which enervates and impairs the strongest constitutions, and renders the short life they enjoy extremely miserable.

The Committee was of opinion that Mr. HAYWARD'S ingenious and useful invention was deserving of a Bounty of Thirty Guineas. To which the Society agreed, April 18, 1763.

THE Society having been informed that our manufacturers of woollen, linen, and cotton, find it extremely difficult, in the summer season, when the spinners are out at harvest work, to procure a sufficient number of hands, to keep their weavers, &c. employed; and that, for want of proper dispatch in this branch of our manufactures, the merchants orders for all sorts of piece goods are often greatly retarded, to the prejudice of the manufacturer, merchant, and nation in general; the Society therefore

therefore concluded, that an improvement of the Spinning-wheel would be an object worthy of their notice : accordingly, they published the following advertisement, March 16, 1761. “ For the best invention of a machine that will spin six threads of wool, flax, hemp, or cotton, at one time, and that will require but one person to work and attend it : (cheapness and simplicity in the construction will be considered as part of its merit) for the best, Fifty pounds ; for the second best, Twenty-five pounds.”

In consequence of these premiums, several ingenious improvements have been made to the Spinning-wheel ; but as neither of them effectually answered the purpose intended, the premiums were continued ; and a machine for spinning six threads was produced by Mr. GEORGE BUCKLEY, and examined by the Committee of Manufactures, February 28, 1763.

C H A P. II.

A short Description of Mr. JOHN WEBB'S SPINNING-WHEEL.

THIS Wheel spins two threads, and reels at the same time : the wheel is sixteen inches and three quarters diameter, and three quarters of an inch thick ; with a groove on its periphery for the cords or bands which actuate the spindles, bobbins, and flyers ; these movements are curiously made, and much improved, by this Candidate ; the axis of the wheel turns in two wooden sliders,

sliders, which occasionally move up and down in a groove in each of the two standard posts, mortised into the bed of the machine; these sliders regulate the tightness of the bands, by means of a wooden screw inserted into the bed of the machine; this screw is connected to the sliders, and is used for the purpose before-mentioned. The treadle, crank, rod, &c. are well disposed, and properly fixed to give freedom to the movements, and the spinner a full and ready command of them, on all occasions. The Wheel is connected to the Spinning-wheel with a cord or band, which revolves round the nut of the Wheel and the nave of the reel; the tension of this band is regulated by a rod, or stick, two feet one inch long, and one inch diameter; the end of this rod is inserted into a round hole in the bed of the Spinning-wheel, and the other end screws into the stem of the reel, its nut, or female screw, which serves to set the reel and Wheel at a greater or less distance from each other; by which means the cord, or band, is easily strained, or loosened, at pleasure: and the number of yards of thread spun and reeled, ascertained by a signal given with a hammer, properly fixed for that purpose.

This Wheel was examined and worked in presence of the joint Committees of Manufactures and Mechanics, who came to a Resolution that Mr. WEBB was entitled to the Premium of Twenty Pounds, for his Spinning-wheel. To which Resolution the Society agreed, March 25, 1761.

C H A P. III.

*A short Description of Mr. THOMAS PERREN'S SPINNING-
WHEEL.*

THIS Machine is constructed on the principles of a common wheel, for spinning two threads of flax, or hemp, at the same time, by one person.

It was examined and worked in presence of the joint Committees of Manufactures and Mechanics, who found it constructed on plain and simple principles ; and, as it had been used with success, and came well recommended by the Minister and Churchwardens of the Parish of Martock, in the County of Somerset, the Committee came to a Resolution to give the Second Premium, of Ten Pounds, to the said Mr. THOMAS PERREN ; and, as he had been at a considerable expence in bringing it to Town, and had been here on that account a long time, the Committee recommended it to the Society to give a farther Sum of Five Guineas. To which the Society agreed, March 25, 1761.

C H A P. IV.

*A short Description of Mr. THOMAS PERREN'S LONGSHED
SPINNING-WHEEL.*

IT is commonly the work of two people to spin coarse linen yarn with Longshed Spinning-wheels ; viz. one to draw out the
flax,

flax, or hemp, and the other to turn the twisting-wheel; this Candidate has contrived a method of saving the expence of the latter, and, at the same time, twist the yarn with more accuracy than can be done the usual way: this is performed with a strong fash-line which revolves round several pullies, as hereafter mentioned: on the axis of the twisting-wheel is fixed a conical wherrer, with three grooves for the fash-line to run in; over this wherrer, about five feet from the ground, is fixed a single grooved pulley, ten inches diameter: two other pullies, of the same dimensions, are fixed to a post at the farther end of the shed, opposite to the twisting-wheel, distant therefrom about twenty yards; these pullies support, and give a proper direction to, the fash-line, (whose ends are spliced together) which revolves, like a common jack-line, round the pullies before-mentioned.

The under limb of the line is conveyed off, at right angles from the conic wherrer, to an horizontal pulley fixed about ten or twelve inches from the left side of the twisting-wheel; the upper limb is carried up, in an oblique direction from the said wherrer, about five feet from the ground, where it revolves round a vertical pulley fixed over the horizontal pulley before-mentioned; both limbs of this line are turned off at right angles with the face of the twisting-wheel, and revolve round two vertical pullies fixed, one over the other, to a post at the farther end of the shed, or walk, and act in contrary direction to each other: this line is put in motion by a small iron pin fastened to its under limb and to a hook, or loop, tied round the waist of the spinner; both limbs of the line run parallel with the floor, from one end of the shed to

to the other: the under limb is fixed at a convenient height from the ground for the spinner to lay hold of, and fasten thereto an iron pin, and the hook tied round the waist of the spinner; who, by that means, draws the line after her as she walks backward to the end of the shed: by this simple contrivance the twisting-wheel is put in motion, and the thread is spun and warped at the same time, without the assistance of any other person to turn the twisting-wheel.

There is another line, or band, whose ends are spliced in the same manner as the former: this line runs in a groove in the twisting-wheel, and gives motion to the spindles which spin the thread: the tension of this line is regulated by two wooden screws fitted to the upper part of the frame of the machine. At the right side of the spinner, at each end of the walk, is fixed a post, with bars, or trundles, properly fitted to receive the warp, or thread, and lease.

This Machine was examined and worked in presence of the joint Committees of Manufactures and Mechanics, who were of opinion that it was deserving of the First Premium of Thirty Pounds: to which the Society agreed, April 8, 1762.

C H A P. V.

*A short Account of Mr. GEORGE BUCKLEY'S MACHINE for
Spinning Six Threads at the same Time, by One Person.*

THIS Machine did not fully answer the purpose intended; but, as the principles on which it was constructed were very simple, and appeared to be very promising, and its parts and movements well adapted to perform their different operations with tolerable facility, the Committee was in great hopes that this desirable improvement in the art of spinning would shortly be brought to perfection, therefore appointed a meeting, February 28, 1763, to examine the Machine brought in by Mr. BUCKLEY, for spinning six threads at one time; accordingly it was very minutely examined, and the Committee was of opinion that the Machine appeared to have a great deal of merit, and capable of improvements, although it was not so perfect as to deserve the First Premium of Fifty Pounds; but recommended to the Society to give the Inventor the Sum of Twenty-five Guineas, as an Encouragement for his Ingenuity. To which the Society agreed, March 25, 1763.

C H A P.

C H A P. VI.

A short Description of Mr. HARRISON'S SPINNING-WHEEL.

THIS Wheel spins two threads at once, and is constructed as follows; viz. its basis is a triangular frame on an inclined plane, to which is fastened three standards, or posts, two in front, and one at its angular point, at the back of the frame: the two front posts are twenty-one inches and an half long, and one inch and one-eighth square; the back post is two feet six inches and an half long, two inches and an half broad, and one inch thick: the sides of the triangular frame are two feet nine inches and an half long, two inches and an half broad, and one inch thick. There are two horizontal rails mortised into the upper ends of the two front posts; these rails are twenty inches and a quarter long, one inch and a quarter broad, and one inch thick; distant from each other nine inches, from out to out: the spindles of the bobbins and flyers work side by side, and are fixed to those rails in a perpendicular position. The Spinning-wheel is twenty inches diameter, and one inch thick; the under part of its iron axis is formed into a crank, whose radius is one inch and an half; its under end turns on a steel conic point, and is fixed to an angle of seventy degrees, by which means the Wheel revolves in an oblique direction, leaning towards the spinner, and is actuated by an horizontal wooden rod, connected with two iron center-pins to a perpendicular piece of wood mortised into the axis of the treadle, and to the crank.

of the iron axis. On the upper ends of the two front posts are fixed two tin cups, each of them filled with a sponge and gum-water, for the spinners to wet their fingers when they find it necessary so to do. The flyers, bobbins, &c. are fixed to a small wooden frame hung with hinges, to one of the front standard posts; this frame serves to regulate the tension of the cords, or bands, of the Spinning-wheel, &c.

This Spinning-wheel was examined and worked in presence of the Committee of Manufactures, who was of opinion that Mr. HARRISON was entitled to the Premium of Fifty Pounds. To which the Society agreed, April 11, 1764.

C H A P. VII.

A short Description of Mr. THOMAS PERREN'S MACHINE for Spinning, Doubling, and Twisting.

THIS Machine is chiefly intended for workhouses, and is constructed in such a manner as to employ eight children, at the same time, either in spinning, or doubling and twisting: its frame, or stand, is a parallelogram, whose sides are five feet two inches long; its ends are twenty-one inches, from out to out; and height, from the ground, two feet three inches and an half: at each end of the frame is erected a short post, with an iron spindle driven tight into each of them, for the Spinning-wheels to turn on; these wheels are three feet six inches diameter, having a band, or
line,

line, round each of them, which gives motion to the bobbins, flyers, &c. The wheels are turned with winches, of a convenient radius to be worked with ease by children : the posts which sustain the wheels are fixed three feet five inches distant from the ends of the frame, and are fastened thereto with a stay, or brace, to the said frame. The spinners sit, three a breast, opposite to each other, on each side of the frame ; and each of them may spin with one hand, or both, and has power immediately to stop, or put in motion, the spindles, flyers, &c. belonging to her own work, without any let, or hinderance, to the other spinners : this is performed by the pressure of the foot on a treadle fitted for that purpose to each spinner's apparatus. On the upper part of the Machine, between the two sets of bobbins, flyers, &c. are fixed six spiral springs, in a perpendicular position, and inclosed in a wooden case ; which case extends from one of the end rails of the frame to the other, and is permanently fixed thereto with wood-screws. These springs are connected to the six treadles, and counter-act their motion, when the action of the bobbins, flyers, &c. has been stopped by the pressure of the foot on the said treadles. The large wheels, or first movers, are turned with ease by two children.

The Committee was of opinion that this Candidate was entitled to the Second Premium, of Twenty Pounds. To which the Society agreed, May 6, 1765.

C H A P. VIII.

*A short Description of Mr. WILLIAM CRAGER'S MACHINE
for Winding and Doubling Woollen, Linen, or Cotton Yarn, &c.*

THE two principal parts of this Machine are the reels, or skeigners, and the spulls, or bobbins, &c. these are comprehended between two light triangular frames, or stands, on whose bases are erected two perpendicular stiles, or pieces of wood, three feet and half an inch long, three inches broad, and one inch thick : the stiles and triangular frames are connected with two horizontal rails three feet three inches long, four inches and an half broad, and half an inch thick : one of these rails is fastened to the bottom of the stiles, and the other to the upper part of the said stiles : this upper rail supports a plancere, or wooden bed, to which the spulls, or bobbins, &c. are properly disposed and fixed for the purpose intended. The space under the plancere is divided with thin slips of wood into twelve equal parts, which contain twelve reels, or skeigners, fixed on separate axes, which turn in a vertical direction, and are sustained on the perpendicular thin slips, or partitions, before-mentioned. When the yarn is properly placed on the reels, or skeigners, their ends are carried up through twelve loops, or helixes, and laid over a small round bearing-bar, fitted for that purpose on the bed of the Machine ; and from thence conveyed, in a convergent direction, to two single helixes, which serve to direct the yarn in such a manner as to wind up obliquely
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on the spalls, and, at the same time, fill the spalls fuller in the middle than at their extremity. This operation of doubling and winding off from the skeins is performed by a winch fixed to a wooden axis, on which are two wooden spur-wheels, eight inches diameter, with eighty teeth: these wheels give motion to two wooden pinions fitted to the spindles of the spalls.

The Committee examined this Machine, and, finding it had a great deal of merit, recommended to the Society to give the Inventor Ten Pounds, Part of the Premium of Seventy-five Pounds, on condition that he left the Machine as the Society's Property. To which the Society agreed, April 17, 1765.

C H A P. IX.

*A short Description of Mr. JEREMIAH BURROW'S MACHINE
for Winding, Doubling, and Twisting, Woollen and Cotton Yarn.*

THIS Machine consists of two reels, seventeen inches in diameter, with eight rounds, or bars, in each: it turns on a wooden axis, to which is fixed a spur-wheel, nineteen inches diameter, with eighty cogs; this wheel is actuated by a lantern-wheel with eight trundles fixed on an iron spindle. The axis of the reels is supported by two perpendicular standards, or pieces of wood, each of them twenty-three inches long, four inches broad, and one inch thick: these standards are dove-tailed into the ends of the curved bottom and frame of the Machine; and, as before-mentioned,

mentioned, sustain the axis of the reels, and the iron spindles of the lantern-wheel, to whose spindles is fixed, also, a vertical crown-wheel, one foot diameter, with forty-four cogs ; this wheel gives motion to an horizontal crown-wheel, one foot diameter, with thirty-three cogs on its upper surface. This horizontal wheel is one inch and an half thick, having a flat groove, one inch broad, on its periphery ; round which revolves a leather strap, or band, which turns the bobbins, spools, &c.

This and the foregoing Doubling Machine consist of several ingenious contrivances ; but, as the Society's advertisement concerning them was not fully expressed, the Machines produced were not so perfect as the Committee expected ; however, as they appeared to have a great deal of merit, it was adjudged that each of the Candidates was deserving of Ten Pounds, Part of the Premium of Seventy-five Pounds, on condition that the Machines were left the Property of the Society. This Resolution of the Committee was agreed to by the Society, April 17, 1765.

C H A P. X.

A short Description of Mr. GARRATT'S MACHINE for Spinning, Doubling, and Twisting, Linen, Woollen, or Cotton.

THE principal movements of this Machine are contained in a wooden frame, three feet high, two feet broad, and seventeen inches deep. The first mover is a wheel twenty inches diameter, and one inch and an half thick, with two grooves and bands on its periphery : on the axis of this wheel is fixed a curved
arm,

arm, or crank, whose radius is four inches ; which is connected to the treadle by means of a perpendicular wooden rod, which actuates the wheel by the pressure of the foot on the said treadle : on the middle of the axis is an endless screw, which gives motion to an escrow wheel, six inches diameter ; on whose arbor is fixed two reels, to wind off the yarn and the worsted, after spinning and twisting. On the top of the frame, in front, are fixed two spindles, flyers, &c. for spinning ; and on the back part there are two spindles, or spools, for twisting : in the middle of the frame there is a dial, or index, to shew the number of yards reeled into skeins.

The Committee resolved that Mr. GARRATT was entitled to Thirty Pounds, part of the First Premium. To which the Society agreed, April 9, 1766.

C H A P. XI.

A short Description of Mr. WILLIAM GARRATT's MACHINE for Doubling and Twisting Yarn, &c.

THIS Machine is constructed much on the same principles as Mr. GARRATT's Spinning-wheel ; but, instead of having two spindles for spinning, and two for twisting, this has four spindles for twisting only ; and these are placed side by side, in an horizontal direction, in the fore-part of the Machine ; on whose upper rail is erected a wooden frame, three feet five inches square : this frame
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is divided into twelve equal parts, or divisions, containing twelve skeigns of yarn; each of which skeigns revolves in a vertical direction round two bobbins, whose pivots turn in the perpendicular bars of the partitions, and may, occasionally, be set at a greater or less distance from each other, according to the length of the skeign. The yarn is wound off from the skeigns upon four bobbins, having first passed through the eyes, or holes, in the spindles and flyers, to which they are directed by four wire loops, or helixes; and the number of yards reeled are ascertained by a dial, in the same manner as they are in Mr. GARRATT's other Machine.

This operation is performed by the pressure of the foot on the treadle, which gives motion to the twisting-wheel, &c.

The Committee of Manufactures examined this Machine, and recommended to the Society to give this Candidate Twelve Pounds, part of the Premium of Twenty-five Pounds; on condition of his leaving his Machine the Property of the Society: which was agreed to, April 9, 1766.

C H A P. XII.

A short Description of the Reverend Mr. PULLEN'S SILK-REEL.

THE Society having thought proper to encourage the culture of silk in our Colonies, by considerable premiums, the Reverend Mr. PULLEN was so obliging as to present the Society with

with a short account of the culture and management of filk worms, together with a model of his filk-reel, the utility of which he has set forth in a letter to the society, February 6, 1758 ; a copy of which letter, as far as it relates to the Reel, is as follows.

“ The machine before you is a model shewing a new construction which I have given to the Silk-reel ; in which I have,

“ First, reduced it to the simplicity of having but two wheels instead of four, as is the present usage.

“ II. I have fixed such a proportion, that the moist thread of filk shall not fall lengthwise on another, till after the reeling of six hundred yards ; whereas it commonly falls on it after about an hundred and fifty, and before it has time to dry.

“ III. I have given an easy method of reeling the filk with a double crossure, instead of the single one, by which means the thread is more dried and embodied, so as to be fit for making into organies, or warp. Before I end, I must offer one observation ; viz. that, whenever great quantities of filk are produced in our American Colonies, it must be the work of private families : public filatures may begin, and set a good example, but cannot produce great quantities of filk : it is therefore hoped that the making Silk-reels of a more easy and simple construction, will be an inducement to bring private families into the use of it.

“ I am, Gentlemen, your most obedient,

“ Humble servant,

“ SAMUEL PULLEN.”

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C H A P.

C H A P. XIII.

A SILK-REEL presented to the Society by JOHN POWNAL, Esq.

THIS Reel was brought from Georgia, where such Reels are now in use in private families; its frame, or basis, is a parallelogram, supported on four legs, five inches and a quarter long; its side rails are two feet eleven inches long; the end rails are fifteen inches and a quarter long, one-third of an inch broad, and one inch and a quarter thick: at each end of the side-rails, is erected a round pillar, or post, fourteen inches long, and one inch and an half diameter. The axis of the Reel turns in the heads of the two front pillars. The guide-stick passes through a hole in one of the back pillars, and is actuated by a vertical spur-wheel (the first mover) two inches diameter, with twenty teeth, fixed on the inner end of the axis of the Reel: this wheel gives motion to a vertical crown-wheel (the second mover) which is two inches diameter, with twenty teeth: this crown-wheel is fixed to a wooden shaft, or axis, two feet two inches long, and one inch diameter; its pivots turn in the side pillars at the back of the frame: at the inner end of the shaft is fixed another vertical crown-wheel (the third mover) two inches diameter, with twenty-four teeth, which gives motion to an horizontal crown-wheel (the fourth mover) two inches diameter, with twenty-four teeth; on the apex of this wheel is fixed a curved iron arm, or crank,

crank, which gives a progressive and regressive motion to the guide-stick ; by which means the filk is laid in an oblique direction on the Reel, whose bearing bars are fifteen inches long, and its circumference three feet two inches.

C H A P. XIV.

A short Description of Mr. WHYMAN'S STOCKING-FRAME.

THIS Machine consists of four standard posts, framed together with substantial fills, rails, and braces. The two back posts which sustain the Machine are four feet long, four inches broad, and two inches thick. The two front posts, which comprehend the treadles and support the hosier's seat, are two feet two inches long, and three inches square ; the distance from the fore edge of the seat, to the back edge of the hind post, is two feet two inches.

The flur-wheel is fourteen inches diameter, and an inch and an half broad on its periphery, and is connected to the flur-box pullies with a small cord.

On the axis of this wheel is fixed a roller five inches and an half diameter, round which there is a strong cord with which the two outermost treadles are connected to the flur-wheel and flur-box pullies, &c. The middle treadle is connected to the preffer-bar with an iron rod, leather straps and a pulley, much in the same manner as in common Frames.

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The needles, finkers, jacks, &c. are formed nearly in the same manner as in common Stocking Frames, but are disposed of and fixed somewhat different.

The wrapper-screws are placed in the front of the frame; and the stay, spring-bar, and springs, are fixed on the upper part of the frame, behind the jacks.

The hanging-joints and balance-bars are properly and conveniently fitted for the purpose intended.

The gage of this Frame is made with twenty-two finkers to an inch: it was worked in presence of the Committee of Manufactures, who was of opinion that it deserved the whole Premium of One Hundred Pounds. To which the Society agreed, April 16, 1766.

E N D OF BOOK V.

B O O K VI.

M A N U F A C T U R E S.

C H A P. I.

*Premiums and Bounties for Employing the Poor in Parish
Workhouses.*

THE management and employment of the poor in different branches of the woollen, linen, and cotton manufactures, in parish workhouses, having been considered by the Society for the Encouragement of Arts, Manufactures and Commerce, as an object worthy of their notice, they, with great candour, perused a plan drawn up for that purpose by Mr. William Bailey; and, as an encouragement for him to publish the said plan, gave him a gratuity of Fifty Pounds; and, at the same time, ordered the following Advertisement to be published in the News-papers.

Strand,

Strand, May 24, 1758.

Notice is hereby given, that the Society for the Encouragement of Arts, Manufactures, and Commerce, will give the under-written Premiums to such Parishes as shall, either separately, or jointly, set up, open, or regulate Workhouses, for the Relief and Employment of the Poor, upon the Plan lately printed, and published by Mr. WILLIAM BAILEY; and as shall, before the Third Wednesday in February, 1760, lay before the Society, in Writing, an Account, or Narrative, of their Proceedings; with such Remarks as their Experience, in the Execution of the said Plan, shall point out as Material.

In consequence of which advertisement, several workhouses were set on foot, and the following premiums paid to the Superintendents of the Workhouses hereafter mentioned: viz.

March 7, 1759. To Mr. John Sculford, superintendent of the workhouse of St. Dunstan's in the West, for woollen yarn, spun by the poor in the said house, - - - - £.15

To Mr. Robert Price, superintendent of St. Luke's workhouse, for linen yarn, spun by the poor in the said workhouse, £.10

To Mr. William Hay, superintendent of the workhouse at Luton, in Bedfordshire, for cotton yarn, spun by the poor in the said house, - - - - - £.10

March 26, 1760. To Mr. Neal, superintendent of the workhouse at Chessent, Hertfordshire, for woollen yarn, spun by the poor in the said workhouse, - - - - - £.12

To Mr. Leonard Snowden, superintendent of the workhouse at Clerkenwell, for woollen yarn, spun by the poor in the said workhouse, - - - - - £.8

March

March 25, 1761. To Mr. Thomas Perren, superintendent of the workhouse at Plymouth, Devonshire, for linen yarn, spun by the poor in the said workhouse, - - - - £.20

1762. To John Vaux, for spinning fine linen yarn, 30

Premiums and Bounties paid for Spinning fine Linen Yarn, besides what were paid to the Superintendents of Workhouses.

1761. To Mr. Samuel Wilson, for fine linen yarn, £.5 5

1762. To Mr. Samuel Wilson, for ditto, - 5 5

1763. To Mrs. Hannah Dunston, for ditto - 5 5

1764. To Mrs. Hannah Dunston, for ditto, - - 8 8

To Mrs. Elizabeth Bishop, for ditto, - 5 5

1765. To Mrs. Elizabeth Bishop, for ditto, - 5 5

1767. To Mrs. Elizabeth Bishop, for ditto, - - 12 12

C H A P. II.

A short Account of the Advancement of the CARPET MANUFACTORY.

THIS Manufacture is brought to so great a degree of perfection in this kingdom, that we actually excel in this valuable branch of the woollen manufacture, which is now become a very considerable article of commerce; and, instead of importing Carpets from abroad, we now export great quantities of them to foreign countries: and, as the Society's premiums and bounties have

have been liberally given for improvement in this art, it is now well established in this metropolis, and many other parts of England ; where it furnishes employment for a great number of poor, and is the occasion of working up a prodigious quantity of coarse wool, which, heretofore, was applied to purposes of much less value to the Manufacturers, and the public.

The principal Manufacturers who obtained Premiums for this Article, were, Mr. Moore, of Chiswell-street, London ; Mr. Witty, of Axminster, Devon ; Mr. Passavant, of Exeter, Devon ; and Mr. Jefferies.

C H A P. III.

Premiums for DRUGGETS of a particular Fabric for Foreign Markets.

IT is well known that the English Druggets are preferable to any made in Europe ; but, notwithstanding their superior merit, there is wanted a particular sort of thin slight Druggets for foreign markets ; the length of which pieces is thirty yards, and their breadth twenty-one inches, at least.

The Manufacturers, who obtained Premiums for this sort of Goods, were, Mr. Williams and Co. Cornwall ; Mr. Walker, of Barnstaple, Devon ; Mr. James Maynard, of Honiton, Devon ; Mr. Pike, of Exeter, Devon ; and Mr. John Maynard, of Honiton, Devon.

C H A P.

C H A P. IV.

Premiums for PAPER for COPPER-PLATE PRINTERS.

IT having been represented to the Society, that the copper-plate printers are in want of a particular sort of thick spongy Paper, like that which is imported from France, the Society thought it an object worthy of their notice ; accordingly, they offered several considerable Premiums for the best English Paper fit for Copper-plate Printers, and nearest in quality to that which is imported from France ; in consequence of which Premiums, several specimens were produced, and approved of by the Committee of Manufactures, who were of opinion that the Candidate, Mr. Thomas Cooke, of Tottenham, was entitled to the Premium of Twenty-five pounds, for Paper produced in the year 1763 ; and the like sum for the same quantity of Paper produced in the year 1764.

C H A P. V.

Premiums for SILK PAPER.

THE Society having been informed that there is a very valuable Paper made of Silk rags, they came to a resolution to offer Two considerable Premiums for the encouragement of this Manufacture ; in consequence of which there were produced several parcels of Silk Paper, of different colours, and of a texture equal to what is imported from abroad.

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The Candidates for this Manufacture were Mr. Taylor, of Wrotham; Mr. Quitch, of Dartford; Mr. Stiles; Mr. Symons, of Hafelmoor; Mr. Chapman; Mr. Cross; Mr. Cole; and Mr. Baskerville, of Birmingham.

C H A P. VI.

The Method of making IMBOSSSED PAPER, discovered and brought to Perfection by Mr. BENJAMIN MOORE, of Newgate-street, London.

SEVERAL ingenious people have attempted to discover the art of making Imbossed Paper, in imitation of that which is imported from abroad; but it is not known that any person has brought it to a tolerable degree of perfection, except Mr. Moore; who, by repeated experiments and great expence, has acquired a method of making it with great accuracy, and in all respects equal to what is imported from foreign countries. Several specimens of this sort of Paper were produced to the Society, and referred to the Committee of Manufactures; who was of opinion that the specimens produced were equal, if not preferable, to any foreign Imbossed Paper; they, therefore, recommended to the Society to give Mr. MOORE a Bounty of Fifty Pounds, for the Discovery and Improvements he had made in this Manufacture: to which the Society agreed, March 21, 1764.

C H A P. VII.

Premiums for making M A R B L E P A P E R.

AN account having been laid before the Society of the great quantity of paper, commonly called Marble Paper, imported into this kingdom, from foreign countries, the Society came to a resolution to offer a Premium of Fifty Pounds to the Candidate who should produce Forty Ream of the best, and nearest in quality to foreign, Marble Paper; and a Premium of Twenty-five Pounds to the Candidate who should produce Twenty Reams of ditto, manufactured in England.

The Candidates, who obtained these Premiums, were, Mr. Henry Houseman, of Endfield, and Mr. Samuel Hervey, June 29, 1763.

C H A P. VIII.

Premiums for making L O S H or B U F F L E A T H E R.

TH E Society having been informed that there were no Loish Hides, commonly called Buff Leather, dressed in England; and that there were annually imported, at a medium, one thousand and twenty-seven Loish Hides for the use of the army; the Society thought this an object worthy of their notice; accordingly, they offered a Premium of Ten Pounds to the person who should produce

duce Five of the best Losh Hides dressed in oil, and equal in goodness to foreign Buff Leather.

In consequence of which Premium, Mr. Bullock, Mr. Gabel, Mr. Becket, and Mr. Colwell, were Candidates, and the Hides produced by them were examined and allowed to be equal in goodness to any imported from abroad, and, in all respects, fit for the use of the army.

N. B. One of the Hides is reserved in the Society's Repository of Manufactures.

C H A P. IX.

LEATHER *Tanned with Oak Saw-Dust.*

THE method of Tanning sheep, calf, and lamb skins, without bark, was discovered by Mr. John Eldridge, of Battle, in Suffex; who, by repeated experiments, had brought to perfection the Tanning of Leather with Oak Saw-dust; and, as he thought it would prove a matter of public utility, he offered, for a valuable consideration, to reveal his secret to the Society, and to perform the operation before any person, or persons, whom the Society should think proper to see the process: which, accordingly, was performed in presence of the joint Committees of Chemistry and Manufactures; who attended, examined, and took minutes of the whole process, which proved to the entire satisfaction

tion of the said Committee; they, therefore, recommended to the Society to give Mr. Eldridge a Bounty of One Hundred Pounds for his discovery. To which the Society agreed, May 23, 1764.

C H A P. X.

The Method of dyeing Leather Red and Yellow in the Manner it is practised in Turkey, communicated to the Society by Mr. PHILIPPO.

SOME years ago, two worthy members of the Society having an intimacy with Mr. Philipo, (who is an Arminian) requested him, when he returned next to Asia, to endeavour to discover the Turkish method of dyeing goats skins Red and Yellow: this was looked upon as a very hazardous attempt; nevertheless, Mr. Philipo having a very great regard for the English nation, and particularly for the two gentlemen above-mentioned, he, with great assiduity and expence, acquired a perfect knowledge of the art: accordingly, at his return, in the year 1766, he discovered to the Society the method of Dyeing Leather Red and Yellow, in the same manner, and with the like ingredients, as it is done in Turkey. The operation was performed by Mr. Philipo, himself, at the Society's office, in presence of the joint Committees of Chemistry and Manufactures, who took minutes of the whole process; and when the skins were completely finished, several experiments were tried

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to prove the durability of the colours, which were found to be better fixed, and more beautiful, than the skins brought from Turkey: the Committee was, therefore, of opinion, that Mr. Philipo was deserving of a Bounty of One Hundred Pounds and a gold medal for his discovery, and for the great trouble and expence he had been at. To which resolution the Society agreed, November 18, 1767.

N.B. Several specimens of the Leather are preserved in the Society's Repository of Manufactures.

C H A P. XI.

Linen, Woollen, Silk, and Cotton, Quilted in the Loom, in Imitation of Marseilles and Italian Quilting.

THE advancement of the art of Quilting in the Loom is very extraordinary: this new and useful manufacture was invented by a poor obscure journeyman weaver, whose views, at first, extended no farther than to make a small quantity of it for the use of his wife and children; but, before it was made into garments for them, it was shewn, as a matter of curiosity, to a gentlewoman, who (two years after) mentioned it to the author of this book; and he, apprehending it might be an object worthy of the Society's notice, with great difficulty, found out the ingenious inventor; of whom he procured a small piece of the said Quilting, which was produced to the Society, whose liberal premiums and bounties

bounties have been the means of bringing this manufacture to a surprizing degree of perfection ; and, as it is extremely beautiful, cheap, and durable, there is now a very great demand for it, both for home consumption and for exportation. The manufacturers, who obtained premiums for it, were, Mr. Humphrey Slim, of Friday-street, London ; Mr. Joseph Shaw, of Belton, in Lancashire ; Mr. Nicholas Badge, of Spital-fields ; Mr. Benjamin Slim, of Old-street, London ; Mr. Jonathan Baker, of Spital-fields ; Mr. Nicholas Pearcal, of Kidderminster ; Mr. John Parrock, of Spital-fields ; Mr. Jonas Clifton, of Shoreditch, London ; Mr. Obediah Rider ; and Mr. Josiah Barnes.

N. B. Specimens of the different sorts of Quilting are preserved in the Society's Repository of Manufactures.

C H A P. XII.

Premium for Tinning Brass and Copper Vessels.

IT is well known that brass and copper vessels, not properly Tinned, will soon rust and canker, therefore vastly improper for the reception of any liquid or solid matter, made use of for victuals, &c. and as it has been found by experience that grain tin is the most proper material for Tinning such vessels, the Society (in the year 1755) offered a Premium of Ten Pounds to the person who should produce the largest brass or copper vessel, containing

taining not less than thirty gallons, Tinned, in a workman-like manner, with pure grain tin ; without lead, or any other alloy whatever.

The Candidate who obtained this Premium was Mr. John Bootie, of Church-court, St. Martin's-lane, London.

C H A P. XIII.

Premiums for P O I N T L A C E.

IT having been suggested to the Society that there are, in foreign countries, a great number of women and girls employed in making Point Lace, and that great quantities of such Lace are annually imported into this kingdom ; the Society, therefore, came to a resolution to offer several premiums for this article, with a view of bringing it to the greatest degree of perfection in this country, and of employing our own people, and circulating, among them, the large sums of money which we pay for it to foreigners.

In consequence of the said premiums, many specimens of Point Lace were produced ; and the candidates, hereafter mentioned, obtained premiums for their curious performances : Miss Esther Bootie, of Church-court, St. Martin's-lane ; Miss Mary Baker, of Harestone, Leicestershire ; Miss Mary Bootie ; Miss Maria Dalles, of Coleman-street ; Miss Lydia la Croy, of Monmouth ; and Mrs. Theodosia Bourgeois, of Derby.

C H A P. XIV.

Premiums for T H R E A D L A C E.

IT having been discovered that a very curious manufacture of Thread Lace has been made with knitting-needles; and that a great variety of flowers, and patterns of various sorts, may be formed with knitting-needles; the Society offered a premium of Thirty guineas, to the person who should produce the greatest quantity of clear, fine Lace, of this sort, not less than six yards in length, and two inches and an half in width.

The candidates for this premium, were, Miss Boulton, of Dean's court, St. Martin's le Grand; Miss Whiteside, of Lancaster; and Miss Gordon, of Folkestone, Kent.

C H A P. XV.

Premiums for C H I P H A T S.

AS Chip Hats were, some time since, imported in great quantities from Italy, a worthy member of the Society was very assiduous in procuring proper information, in every respect, relating to this affair; and, as it appeared that we annually paid

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very

very considerable sums to foreigners, for this manufacture, and that it furnished employment for a great number of women and children ; the active member, above-mentioned, represented it to the Society, as an object worthy of their notice : accordingly, it was taken into consideration, and the manufacture encouraged, by premiums and bounties, several years following ; and the candidates who obtained them, are as under written :

Mrs. Mayer, and

Mr. Benjamin Slim, of Old-street, London.

C H A P. XVI.

Various Sorts of Materials taken from the Stem of the Planting-tree, and Manufactured into CORDAGE, GAUZE, BLOND-LACE, KNITTING, CANDLEWICKS, &c.

THE Society having received, from Mr. Hanway, a sample, of a fabric equal to very fine cambric, or lawn; manufactured, as is supposed, (at Zoar, one of the Philippine Islands) from the fibrous matter of the planting-tree.

This curious production was laid before the Society, together with specimens of three different sorts of materials taken from the stem of the planting-tree : the first, in appearance, is like hemp, or coarse flax, the second like hard silk, and the third like cotton.

These

These materials were worked, by Mr. William Bailey, into the various sorts of manufactures, beforementioned: and, as the Committee of Manufactures was of opinion that the importation and manufacturing of the said materials were highly worthy of the attention of the Society, several large premiums were offered, to excite our ingenious manufacturers to try what advantage could be made of this discovery; but, as there has hitherto been only one very small parcel of the raw materials imported, and that greatly damaged, no further advances have been made in this affair.

C H A P. XVII.

Bounties for STRINGS for Musical Instruments.

IT has been intimated several times to the Society, that the making strings for musical instruments would be the means of employing a great number of hands, and of circulating considerable sums of money among our own people: the Society, at first, thought this too trifling an affair to come under their consideration; but, on further enquiry, found, that the sums annually paid to foreigners, for this article, very greatly exceeded what they at first apprehended; it was therefore thought adviseable to procure a proper person, or persons, to set on foot a manufacture of catgut, (as it is called) in this metropolis: accordingly, by the assistance
of

of an Italian musician, a man and a woman were procured, who had been several years employed in this business, and so well understood it as to carry on, in some remote part of the town, a small manufacture of sheep and lambs guts, for musical instruments and other purposes ; and, as a proof of their abilities, produced several specimens of Fiddle Strings, of their own making, which appeared equal in goodness to what are called Roman strings: nevertheless, it was required that they should make a trial of their skill in this manufacture, at the Society's office, in presence of the joint Committees of Chemistry and Manufactures: this they readily complied with ; and, according to appointment, the whole operation was performed, to the entire satisfaction of the Committee; and, before they left the room, the Strings made in their presence were dried, put into an instrument, and played upon; and, by proper judges, allowed to be equal in tone and goodness to what are imported from Italy : on which, each of the candidates had Six Guineas given them, as a reward for their trouble.

N. B. The Register of the Society has been informed that this manufacture is now carrying on, with good success, by other people, in several parts of the town.

C H A P. XVIII.

*Premiums for Crimping C R A P E S for Mourning
Habands, &c.*

THE Italian method of Crimping Crape has been attempted by many of our ingenious silk manufacturers, and others; but as yet it does not appear that any material advancement has been made in this art; and, as there is a great quantity of it imported into this kingdom, the Society thought it an object worthy of their notice: accordingly, they offered, three years following, large premiums for the greatest quantity of English Crimped Crape for mourning; not less than an hundred yards, and nearest in quality to the Italian Crape.

There were three candidates for this premium; but, as they did not produce the quantity required by the Society's advertisement, neither of them was entitled to the premium: one of them, indeed, has been at a considerable expence in this affair; and has been twice to Naples, on purpose to make himself master of the art of Crimping Crape; and, by the specimens he produced, it is very evident that he has discovered the right method of doing it: as he is engaged in several other branches of the silk manufacture, it is probable it would have been some years before he could have established a manufactory of it in this country; but as this affair is now taken up by two gentlemen who are indefatigable in the pursuit of it, and whose circumstances, spirit, resolution, and station

in

in life, will enable them to surmount all difficulties in the prosecution of it, there can be no doubt but they will shortly bring it to the highest degree of perfection in this kingdom; which is the more likely as they have already produced to the Society a large specimen of Crape, crimped and manufactured so exactly like the Italian, as not to be distinguished therefrom.



E N D O F B O O K VI.



B O O K V I I .

M E C H A N I C S ;

C O M P R E H E N D I N G

*Descriptions and Explanations of such of the Society's
Machines and Models, in Mechanics, as are represented
in the Copper-plates hereunto annexed.*

C H A P. I.

A Description of Mr. STANSFIELD'S Model of a SAW-MILL.

P L A T E I. F I G. I.

A perspective View of Mr. STANSFIELD'S SAW-MILL.

A, **A** Water-wheel, eighteen inches in diameter, and five inches and an half on the periphery, carrying twenty-four buckets. Its shaft is two feet nine inches long, from shoulder to shoulder, and two inches and seven-eighths square.

B,

B, A Crown-wheel, on the same shaft as the water-wheel, its diameter fifteen inches and a quarter, with sixty-four cogs. See Plate II. Fig. 2.

C, A Lantern-wheel, six inches in diameter, with twenty-four trundles.

D, A Triple Crank, or Axis of the Lantern-wheel. Its extreme length is twenty-three inches, thickness one inch and an half. The radius of the Crank is one inch and an half. See Plate II. Fig. 2.

E, E, E, Rods, or Lifters, connected to the crank and saw-frame, No. 1. On the upper end of these Rods is a cross rail, with an iron gudgeon at each end: the gudgeons pass through, and turn in, two holes in the under ends of the saw-frame. The two other saw-frames are connected with the crank, or axis, of the lantern-wheel, in the same manner. See Plate II. Fig. 2.

F, A Ratchet-wheel, seven inches and an half diameter, with an hundred and twenty teeth. This Wheel is a thin rim or plate of iron, screwed to the side of a grooved wooden roller, or barrel, which, with the pinions, revolves with the iron axis, and actuates the rack, carriage, frame, &c.

G, A Lever, nine inches and a quarter long, seven-eighths of an inch broad, and half an inch thick. One end of this Lever turns on an iron pin in the post, near the letter G: the other end passes through a staple fixed to one of the stiles of the saw-frame, No. 1. To this Lever are fixed two iron hooks, one of which, at every elevation of the saw-frame, gradually moves the ratchet-wheel, grooved roller, &c. the other hook serves to stop the wheel from

from going back. N. B. The outer hook is occasionally set nearer to, or further from, the fulcrum, or center-pin, of the Lever, in order to regulate the motion of the carriage-frame, in proportion to the cuts made with the saws at every stroke.

H, H, H, Three Saw-frames, marked 1, 2, 3. Their extreme length is one foot ten inches and an half. The breadth of the stiles is seven-eighths of an inch; thickness, five-eighths. The distance between the stiles is five inches and three-eighths. N. B. Each of the Saw-frames, and carriage-frames, is furnished with a ratchet and grooved roller, or barrel, together with its levers, hooks, winches, lines, pullies, &c.

I, I, I. Three Carriage-frames, two feet seven inches and three quarters long, and five inches broad, from out to out. In the middle of each of the Frames is fixed an iron rack, which is actuated by a pinion on the iron axis, as before-mentioned.

K, K, Two Winches, with their rollers, lines, and pullies, for drawing back the carriage-frames.

L, A Lever, nineteen inches and a quarter long, with an iron hook, which, by slow gradations, turns the ratchet-wheel the length of one tooth, at every elevation of the saw-frame, No. 3. on which the end of the Lever bears. See Fig. 1. and 8.

M, A Ratchet-wheel, with its click, barrel, lines, &c. This Wheel is four inches diameter, with forty teeth. The barrel is one inch and an half diameter, and six inches and a quarter on its periphery: to this is fastened, and wound up, a line, or rope. It is also fastened, and properly connected, to the pullies and crane. See M, Fig. 3.

H h

N,

N, A Crane, whose radius is fifteen inches and an half; this Crane, with its blocks, pullies, &c. serves to take up the stocks, and convey them to the carriage-frames to be sawed.

O, A Wooden Hook, which turns on a center-pin, in a short post erected on the upper end of the mill-frame. This Hook serves to keep the crane in its place, whilst the stocks are drawing up. See Fig. 8.

P, A Saw, nine inches and an half long. This Saw is intended only for cross-cutting the stocks.

Q, A Sliding Valve, in which there is a long mortise, or aperture, to direct the saw as it moves up and down

R, A Lever, two feet long, one inch and an half broad, and one inch and one-eighth thick. One end of this Lever passes through a staple, or plate of iron, screwed to the lower end of the stile of the saw-frame, No. 2. the other end of it is connected with the handle, or stem, of the saw, having a center-pin passing through the end of the Lever and stem.

S, A Leaden Weight, Line, and Pullies, which serve to press the saw forward as it enters the wood.

T, T, T, Three short Posts, seven inches long, and seven-eighths of an inch square, erected on three fills, or short pieces of wood, fastened to the under rails of the mill-frame: there is an horizontal arm mortised into the upper end of each of these posts; and the stock, or plank, to be cross-cut, is to be laid on the three fills, marked 1, 2, 3. The stock is fixed close to the three short Posts, and fastened thereto with wedges, properly fitted to drive in between the stock and the arms of the Posts.

V, V, &c.

V, V, &c. Short Posts, two inches and three quarters long, one inch and one-eighth broad, and three-eighths of an inch thick, with nine holes in each of them. These posts are mortised into the outside rails of the outside carriage-frame, and serve to fasten the stocks to the frames by means of an iron crow passing through the holes; between which crow and the stock is driven a wedge, or wedges, to fix the stock to the carriage-frame. See Fig. 1. and 5.

W, W, W, Three Iron Racks, fastened to the carriage-frames, and actuated by the pinions b, b, b. See Plate III. Fig. 5. and Plate IV. Fig. 6. and 7.

X, X, &c. Friction-rollers, on which the middle carriage-frames pass and repass.

Y, Y, &c. Short Studs, or Tenons, fastened to the floor; their use is to keep the carriage-frames steady, and in a straight direction.

Z, A Stock of Wood, properly fixed to be cross-cut to any scantling.

P L A T E II. F I G. 2.

A Geometrical Elevation of the Saw-Frames, Wheels, Cranks, Lifters, &c.

B, The Crown-wheel, with sixty-four cogs, fastened to the same shaft as the water-wheel. See Fig. 1.

C, The Lantern-wheel, with twenty-four trundles.

D, D, D,

D, D, D, Three Cranks.

E, E, E, Three Rods, or Lifters, actuated by the three cranks, which give motion to the saw-frames.

F, F, F, Three Ratchet-wheels, on whose iron axis are three grooved barrels, marked a, a, a, and three iron pinions b, b, b. The pinions are three-eighths of an inch in diameter, with eight teeth. Each of these pinions gives motion to the racks fastened to the carriage frames, and gradually brings them forward by means of the levers, hooks, and Ratchet-wheel. See F, G, Fig. 1.

H, H, H, Three Saw-frames, &c.

a, a, a, The Barrels, or Grooved Wheels.

b, b, b, Three Pinions, on the same axis as the Ratchet-wheels, and grooved wheels. See description of h, Fig. 5.

c, c, c, Three Iron Staples, through which the levers pass, as before-mentioned.

P L A T E II. F I G. 6.

A perspective View of one of the Saw Frames, with its Levers and Hooks, connected with the Ratchet-wheel and Pinion.

F, The Ratchet-wheel, with its barrel a, pinion, b, &c. See the description of F, in Fig. 1, &c.

G, A Lever, with its hooks, whose use is enumerated in the description of G, Fig. 1.

H, A Saw-frame, marked 1, wherein are two saws, with their stretchers and wedges. See description of H, Fig. 1.

P L A T E

P L A T E II. F I G. 7.

A perspective View of one of the Saws, with its Stretchers and Wedges.

P L A T E III. F I G. 3.

A perspective View of the Floor, Carriages, Rollers, Ratchet-wheels, &c.

F, F, F, The three Ratchet-wheels, and pinions b, b, b. See Fig. 1. and 3.

I, I, I, Three Carriage-frames, &c. on which the stocks are laid to be sawed.

V, V, V, &c. Short Posts, mortised into each of the outer rails of the two outside carriage-frames. An iron crow passes occasionally through the holes in the posts, to steady and fix the stocks to the carriage-frames, as set forth in the description of V, Fig. 1.

W, W, W, Three Iron Racks, inserted into the end rails of the carriage-frames, and fastened thereto with iron keys and bolts, passing through apertures in the middle of the Racks.

X, X, &c. A set of Friction-rollers, over which the middle carriage-frame is drawn.

Y, Y, &c. A set of Wooden Studs, or Tenons, fastened to the floor, and projecting a quarter of an inch above its surface :
their

their use is to guide the middle carriage-frame, in the under part of which are two grooves, or channels, which passing loosely over the before-mentioned Studs, are thereby conveyed, in a straight direction, from end to end.

P L A T E IV. F I G. 5.

A Geometrical Plan of the Water-wheel, Carriage-frames, Ratchet-wheels, &c.

A, A Water-wheel.

F, F, F, The Ratchet-wheels, described and represented in Fig. 1. 3. and 6.

I, I, I, Three carriage-frames, on which the stocks are laid, and fastened with iron crows and wedges, as before-mentioned in the description of Fig. 1, &c.

K, K, Two Winches, with which the carriages are drawn back.

V, V, &c. The short Posts, with nine holes in each, as set forth in the description of Fig. 1. and 5.

W, W, &c. The Iron Racks. See the description of Fig. 7. &c.

X, X, &c. Friction-rollers. See the description of Fig. 5. and 6.

Y, Y, &c. The Studs. See Fig. 3.

a, a, a, Three Barrels, or grooved wheels, on which the lines, or ropes, are gradually wound up, as the carriage moves forward;
and

and by which they are also drawn back with the winch K, when the stocks are sawn quite through.

b, b, b, Three Pinions, connected with the racks and carriage-frames, which are gradually driven forward thereby over the directing studs Y, Y, &c. as already mentioned in the description of Fig. 2.

P L A T E IV. F I G 4.

A Geometrical Plan of one of the Iron Racks. See W, W, &c. in the Description of Fig. 5 and 6.

P L A T E V. F I G. 8.

A perspective View of one of the Saw-frames, Ratchet-wheel, Crane, &c.

H, A Saw-frame, 3.

L, A Lever, actuated by the saw-frame 3. See description of L, Fig. 1.

M, A Ratchet-wheel and Barrel, actuated by the lever and its hook at every elevation of the saw-frame 3.

N, A Crane, with its Pullies, &c. set forth in the description of N, Fig. 1, &c.

O, A Wooden Hook. Its use is indicated in the description of Fig. 1.

Thee

These drawings are taken from a model of a saw-mill made by Mr. James Stansfield, to a scale of one-fourth of an inch to a foot; for which the Society gave him one hundred pounds, and ten guineas for his improvement of a cross cutting-saw added thereto, December 12, 1765.

The original mill, of which this is a model, was erected, and worked for five successive years, in consequence of successive premiums offered, and paid by the Society; amounting in the whole to the sum of two hundred and twenty pounds.

N. B. These drawings are made to a scale of two inches to a foot of the model.

CHAP.

C H A P. II.

*A Description and Explanation of Mr. BURROW'S MACHINE
for Grinding and Polishing Glasses, taken from a Model made to
a Scale of one Inch to a Foot.*

P L A T E I. F I G. 1.

A perspective View of the MACHINE.

A, **T**H E Shaft of the Cog-wheel, is nine inches long, and three-fourths of an inch in diameter; the under end of this Shaft turns on a steel point or pivot, and its upper end is an iron gudgeon, as represented in Fig. 1.

B, An horizontal Cog-wheel, one foot in diameter, with one hundred and sixty-eight teeth. This Wheel gives motion to the small horizontal wheel E, and the vertical wheel V.

C, An horizontal Collar Beam fastened to the perpendicular shaft; this machine is worked with a horse fastened to the horizontal Collar Beam, whose radius is five inches and an half.

D, Two Collar Staves mortised into the collar beam.

E, An horizontal Spur-wheel, one inch and three-fourths diameter, with thirty-two teeth.

F, An Iron Crank, whose radius is half an inch, the upper end of this Crank is the spindle of the small cog-wheel E; its extreme length is five inches seven-eighths; thickness one-eighth and

one-sixteenth of an inch ; this Crank gives a progressive and regressive motion to the iron rod K, which traverses through a jaw in the head of the pillar L.

G, A Brass curved Arm, two inches and eight-twelfths long, with a hole for a center pin at its inner end, and a cock on its upper surface, through which the directing rod K, traverses ; and by the oblique motion of the crank F, the point of the curved Arm G, strikes promiscuously against the teeth of the star-wheel H, by which means an irregular motion is given to the box N.

H, A Brass Wheel, one inch and five-twelfths in diameter, with eleven long teeth : this Wheel is fastened to an iron center pin, fixed in the middle of the wherrer-box N. The upper end of the center pin projects above the surface of the wheel, and passes loosely through a hole in the directing rod K, for which purpose the rod is made flat at that part where the pin passes through.

I, A Jaw, or Notch, in the Pillar, to sustain and guide the directing rod.

K, The Directing Rod, eight inches and an half long, and eight-twelfths of an inch thick. At the inner end of this Rod there is a hole to receive the crank F ; and four inches distant from it, there is another hole to receive the spindle, or center pin, of the wheel H.

L, A Brass Pillar, whose extreme length is three inches and three eighths ; thickness five-eighths of an inch at its base.

M, A Plate of Glass, properly fitted on its bed to be ground.

N, A Brass Wherrer Box, three inches and an half long, and three inches broad : on the apex of its upper surface, is fixed
an

an iron center-pin which passes through the star wheel H, and the middle of the directing rod K.

O, A Block of Wood, on which the glass is truly and properly laid to be ground.

P, A Sand Box, or Bed, four inches and an half by four inches three-fourths, and half an inch deep.

Q, A Pedestal of Wood, whose base is three inches diameter, and height two inches.

R, R, R, R, Four Brass Pillars, each of whose extreme length is eight inches three-eighths, and their diameter at the base eleven-twelfths of an inch; these pillars sustain the cross braces U, U.

S, A flat piece of Brass, eight inches and an half long, five-eighths of an inch broad, and one-fourth of an inch thick, which supports the vertical wheel V, with its axis or crank.

T, A Brass Pillar, four inches three-eighths long, and five-eighths of an inch in diameter at its base. On this pillar is fixed a convex bed W, with a cap properly prepared, either for grinding or polishing concave and convex glasses.

U, U, Two Cross Braces, one of them is two feet long, the other one foot three inches and an half long, five-eighths of an inch broad, and two-twelfths of an inch thick; the spindle of the main shaft A, turns in the center of this brace, and its four arms are fastened to the pillars R, R, R, R.

V, A Vertical Spur Wheel, three inches five-eighths diameter, with fifty-two teeth; the axis of this Wheel is a compounded crank, which actuates twelve polishing rods.

W,

W, A Convex Rod, one inch and a quarter diameter, covered with a concave, or spherical cap. See Fig. 2. On the top of the cap is fixed an iron center pin, which passes through the iron rod Y, as represented in Fig. 1.

X, A Crank, whose radius is three-fourths of an inch; this Crank gives motion to twelve rods, polishers, &c. as before-mentioned. The Crank turns in one of the pillars R, and the other in a flat piece of brass S, fastened to the floor and to one of the arms of the cross brace U.

Y, An Iron Rod, seven inches and an half long, and two-twelfths of an inch thick, with a hole in the middle of it to receive the iron pin in the spherical cap W; one end of this Rod is connected to the crank which gives motion to the spherical cap, the other end passes through a jaw or notch in a brass pillar (not in this view) in the same manner as the Rod I, in the pillar K.

Z, Z, Two Iron Rods, each four inches and a quarter long, and two-twelfths of an inch thick; the fore ends of these Rods are fastened to the polishers with screws and nuts; and their other ends to the crank X, whose reciprocal motion (as before-mentioned) works twelve rods and polishers, more or less, according to the size of the plate of glass.

N. B. Two only of the said rods are represented in this view of the machine.

a, a, a, a, Four Brass Pillars, each of whose extreme length is four inches and three quarters, and eight-twelfths of an inch diameter

diameter at the base. These pillars support the bed, or table, C, on which the glass is placed to be polished.

b, b, The notched Sides of the Bed, or Table, are three quarters of an inch broad, and one twenty-fourth of an inch thick. There are twelve notches, cut down parallel to each other in the Sides of the Bed, for the direction of the rods Z, Z, &c.

c, The Bed, on which the glass is laid to be polished: its dimensions are, five inches and one-eighth long, four inches broad, and half an inch thick.

d, d, The Polishers, clothed, and fastened with screws to the crank rods.

e, A Plate of Glass.

PLATE II. FIG. 2.

A Plan of the MACHINE.

A, The main Shaft, whose dimensions are set forth in the description of Fig. 1.

B, The horizontal Spur-wheel.

C, The Collar Beam.

D, The Collar Staves.

E, The horizontal small Spur-wheel.

G, The Brass curved Arm.

H, The Star, or Ratchet-wheel.

I, The Notch, in the head of the pillar.

K, The Directing Rod.

M,

- M, A Plate of Glafs, fitted to its bed, &c.
- N, The Brafs Wherrer-box.
- O, The Block, on which the plate is cemented.
- P, The Star-box, or Table.
- R, R, R, R, The four Pillars.
- S, A flat Piece of Brafs, which supports the vertical wheel and crank.
- U, U, &c. The Crofs Braces, fastened to the pillars.
- V, The vertical Spur-wheel.
- W, The Convex Bed, &c.
- X, The Cranks.
- Y, The Directing Rods.
- Z, Z, &c. The Directing Rods of the polifhers, &c.
- a, a, a, a, The four small Pillars which support the polifhing frame.
- b, b, The Sides of the Polifhing Frame, with notches cut down for the rods to run in.
- c, The Block, or Bed.
- d, d, The Polifhers.
- e, The Plate of Glafs.
- f, A small Pillar, five inches and three quarters long, not feen in the perspective view, Fig. 1. On the top of this Pillar there is a notch, or aperture, through which the rod of the fpherical cap paffes in its retrograde motion.

The original Machine was invented by Mr. Burrows, who kept it at work three months, for which he obtained a premium of feventy pounds, May 20, 1765. The Model of this Machine was purchafed of Mr. Burrows, for the fum of twenty guineas, May 10, 1767.

C H A P. III.

A Description of Mr. PINCHBECK'S CRANE.

P L A T E I. F I G. I.

A perspective View of the Model of the CRANE, made to a Scale of a quarter of an Inch to a Foot.

A, **T**HE Floor, on which the crane is erected.

B, B, &c. The Posts of the Frame, are one foot eleven inches long, from shoulder to shoulder, and one inch square.

C, C, C, C, Four side Rails, one foot eleven inches long. The two upper rails are one inch square, and the two under rails one inch and a quarter broad, and one inch thick.

D, D, Two Transoms, seven inches long, and one inch square.

E, The great Walking Wheel, in which the men walk, is one foot seven inches in diameter, and four inches and an half broad on its periphery.

F, F, The Axis of the Walking Wheel, is six inches and an half long, from shoulder to shoulder ; four inches and five-eighths of its length, are two inches and one-eighth square : and the cylinder, or round part, (on which the rope is wound up) is two inches in diameter.

G,

G, A Spur-wheel, three inches and one-eighth in diameter, with ninety-six teeth. This wheel gives motion to the pinion and crank H, I.

H, An Iron Pinion, with eight teeth; the spindle of this Pinion turns in a brass frame, fastened to the front under rail of the frame: at the end of the spindle there is a crank, whose radius is half an inch: this crank is connected to the feeding bellows L, by the iron rod K.

I, A Crank, fixed on a square in the fore end of the spindle of the pinion H.

K, An Iron Rod, fourteen inches and an half long; its upper end is hung to the crank I, its under end passes through an aperture in the floor, and is fastened with an iron pin to the under-board of the feeding bellows L.

L, The End of the Feeding Bellows, to which the rod K is fastened as before-mentioned.

M, A Dial Plate, or Regulator, one inch and five-eighths diameter, fixed to a pedestal on the floor. A segment of this plate is divided into three equal parts, marked 1, 2, 3, with a directing hand, by which the motion of the walking wheel is regulated in the following manner; viz. when the directing hand points to No. 1, the aperture g (for discharging the wind out of the bellows) is dilated to its greatest extent, to give vent to the wind. When it is set to No. 3, the aperture is contracted to its smallest dimensions, by which means the upper bellows retains the blast of wind, which the feeding or under bellows throws into it; and, by this means, its upper board is elevated so high as to raise the lifter Q, and the other movements connected thereto.

N, A perpendicular Iron Spindle, five inches long, and a quarter of an inch diameter. This Spindle passes through the center of the dial plate M, having a directing hand fixed to its upper end, and to its under end an horizontal crank, whose radius is one quarter of an inch.

O, A Brass Arm, or Leader, which serves to open and shut the sliding valve P, its length is one inch and three-eighths; its extreme breadth is a quarter of an inch, and its thickness a twenty-fourth part of an inch: at the fore end of this Leader, is rivetted an iron pin, which passes through the crank, and at the other end there is a small hole to receive the iron pin rivetted to the sliding valve P.

P, A Sliding Valve, which runs in a rabbet in the upper-board of the receiving bellows; its dimensions are one inch and an half in length, seven-twelfths of an inch in breadth, and one-twelfth of an inch in thickness. This Valve is regulated by the directing hand of the regulator M, at the bottom of whose spindle are fixed the crank and leader, as before-mentioned. See Fig. 3.

Q, A Lifting Trundle, one inch and five-eighths long, and a quarter of an inch in diameter. This Trundle is capped with a thin round piece of wood, one inch and an half diameter, and one eighth of an inch thick. This Trundle passes through the floor, extending so far below it, as to embrace and be lifted up by the upper-board of the receiving bellows, when the walking-wheel accidentally revolves with too great a degree of velocity.

N. B. The Trundle, latch, sliding bolt, and all the other movements connected thereto, are at all times in a state of rest, till

K k

the

the walking-wheel (as before-mentioned) is by some accident violently agitated; and, when it so happens, the expansion of the bellows will be immediately so far extended, as to lift up the Trundle, latch, &c.

R, An Iron Latch, whose length from its center of motion b, to the extremity of its right angled arm c, is two inches; and from c, to d, one inch, and one-twelfth. Its height from b, to e, is one inch and three-twenty-fourth parts of an inch, and from b, to its shoulder f, is seven twelfths of an inch. Its breadth is two-twelfths of an inch, and thickness one-twelfth. The arm of the Latch c, d, is actuated by the trundle Q, as represented in Fig. 1, 2, 4.

S, A Curved Spring, four inches and an half long, and one inch broad at the end, which is fastened to the floor, and one-third of an inch broad at its point, or nose, which lies under the sliding-bolt. At this end of the Spring, there is a square hole for the apex and shoulder e, f, of the latch, to pass and repass freely through, when the nose of the Spring is pressed down by the curved piece of brass l, on the under-side of the sliding bolt. See Fig. 4.

T, A Flat Sliding Bolt, eleven inches long, one-third of an inch broad, and one-twelfth of an inch thick. At each end of the Bolt, there is fastened a nut, or square piece of brass, which serves to stop its motion, when either the walking-wheel, or the weight and brake W, Z, have drawn it against the staples V, V, the distance required for the curved piece of brass l, to press down the nose of the spring S, by which means the shoulder f, of the latch,

latch, is either fixed, or disengaged therefrom, as before-mentioned. See Fig. 1, 2, 4. The weights W, and the brake Z, are connected to the Sliding Bolt by lines i, k. See Fig. 1, 2.

U, Two Pullies, three-fourths of an inch diameter. The pullies run in a brass frame fastened to the floor; their use is to convey the line i, at right angles, from the sliding bolt T, to the upper Pulley Y, and the line k, to the brake, or hug Z. See U, i, k, Fig. 1. 2.

V, V, Two Staples, fastened with wood-screws to the floor. These Staples serve to direct and stop the sliding bolt, when the walking-wheel, or the weights have drawn it to the distance required. The Staple, which is fixed near to the center of the walking-wheel, is made of a height sufficient for the bolt to rise and catch the studs a, a, &c. of the walking-wheel; but the other Staple has only an aperture fit for the bolt to pass through freely.

W, Three Lead or Iron Weights, (which, for a large crane, are about half an hundred each) with holes in their centers for the line i to pass through, and cavities in their under surfaces to receive the separate knots in the said line, which are about three inches distant from each other, and on which the three Weights are suspended, and gradually lifted up, one after the other, by the progressive motion of the sliding bolt T; by which ingenious contrivance, the walking wheel is stopped, in its greatest velocity, by such gentle degrees as not to be shocked, or scarcely felt by the men in the wheel.

X, A Spiral Spring, which is of such strength as to be extended about four inches before the first weight begins to be lifted.

up.

up. The two other weights are lifted up, one after the other, by their respective knots, in the same manner as the first. The ingenious inventor judiciously applied this Spring, and the knots in the line i, to prevent it from breaking by the sudden tension, or jerk, which it otherwise would receive from the motion of the sliding bolt. The line i passes through the circumvolutions of the spring, and is fastened to each end of it; but it is so loose within its circumvolutions, as to suffer the Spring to be extended, as before-mentioned, four inches before the first weight begins to rise.

Y, A Pulley, one inch and an half in diameter, fastened to the under side of the fore transom D.

Z, A Brake, or Hug, one end of which is fastened to the hind transom of the frame, and the other to the link of the sliding bolt, which occasionally draws down the Brake on the periphery of the walking wheel; which causes so much friction thereto as gradually to impede its motion, till one of the studs a, meets the inner staple of the sliding bolt. See V, V, Fig. 1. 2.

a, a, &c. Twelve Brass Studs, which are fastened with screws to the periphery of the walking wheel, and serve to put a total stop to it, when, by accident, its motion is accelerated.

e, The Point of the Latch. See Fig. 4.

f, The Shoulder of the Latch. See Fig. 1. and 4.

g, The Aperture, through which the wind is discharged out of the receiving bellows, by a proper contraction of it with the valve P. See Fig. 3.

h, A Brass Cock, fastened to the floor to receive the pin, or fulcrum b, of the latch R. See Fig. 4.

i,

i, A Line, fastened to the sliding bolt T, to which the weights W are suspended.

k, A Line, fastened to the brake Z, and sliding bolt T.

l, A curved Piece of Brass, fastened to the sliding bolt T.

F I G. 2.

Q, The Cap of the Trundle,

R, The Iron Latch. See Fig. 1.

S, The curved Spring. See Fig. 1.

T, The Sliding Bolt.

U, The Pullies.

V, V, The Staples.

c, d, The Arm of the Latch.

e, The Point of the Latch. See Fig. 4.

h, The Brass Cock, or Fulcrum of the Latch.

i, The Line of the Weights.

k, The Line of the Brake.

l, The curved Piece of Brass, which presses down the nose of the spring S.

F I G. 3.

M, The Dial Plate, or Regulator, with its directing Hand.

N, The Spindle of the Regulator.

O, The Arm of the Leader, which opens and shuts the sliding valve.

P,

- P, The Sliding Valve.
 g, The Aperture, through which the wind is discharged.

F I G. 4.

- R, The Latch, with its cock or fulcrum.
 b, The Iron Pin, on which the latch turns.
 c, d, The Arm of the Latch.
 e, The Point of the Latch.
 f, The Shoulder of the Latch.
 h, The Cock, or Fulcrum of the Latch.

F I G. 5.

- Q, The Cap of the Trundle in Fig. 1.

This new invented Crane was referred to the Committee of Mechanics, who was of opinion that this method of preventing fatal accidents (which frequently happen in common walking Cranes) is entirely new, ingenious, and very effectual for the purposes for which it is intended. A trial of the Crane was made several times, at Dice's Key, with an hoghead of pot-ash, sixteen thousand pounds weight; and it appeared to the Committee that the invention will fully answer under all circumstances, and may be constructed at an easy expence: it was therefore recommended to the Society, to give Mr. Pinchbeck the gold medal of the Society, for his ingenious and useful invention. To which the Society agreed, June 3, 1767.

C H A P. IV.

*A Description and Explanation of the Model of Mr. WIRTZ'S
HYDRAULIC MACHINE, presented to the Society
by RODOLPH VALTRAVERS, Esq.*

P L A T E I. FIG. I.

A perspective View of the MACHINE.

A, **A** Pedestal, or Block of Wood, eight inches diameter, and one inch and three quarters thick.

B, A Brass Crotchet, screwed to the pedestal and properly fitted to the solid, and also to the hollow end of the axis of the machine. The jaws, or notches, in the upper part of the Crotchet, are intended only for the conveniency of taking the machine off, occasionally, from the pedestal, and putting it on with as little trouble as possible.

C, A Brass Cock, one end of which is rivetted to the crotchet, the other is turned up at right angles with the horizon, and is properly indented to embrace the neck, or perpendicular part of the brass tube D, connected to the hollow part of the axis.

D, A curved Brass Tube, whose perpendicular end is a male screw, fitted to the end of the glass tube E, and its under end to the brass socket F.

E,

E, A Glas Tube, with brafs screws cemented to each end of it, for the conveniency of adding thereto a fufficient number of tubes, to raife the water fix feet above the axis of the machine.

F, A Braft Socket, fcrewed to the under end of the curved tube; within this focket there is another fmall one on which the outside focket turns, as represented in this fection of the machine.

G, The hollow End of the Axis.

H, A thick round Braft Plate, which, in this view, appears like two pieces of brafs rivetted together; this plate is foldered to the hollow part of the axis, and fitted, water tight, to the fide of the wheel; for which purpofe there is a piece of leather put in between the faid plate and the wheel, which are preffed together with the brafs nut N, fitted to the fcrew on the folid part of the axis.

I, The upper Rim of the Braft Plate, lined with leather, as before-mentioned.

K, A Braft Wheel, fix inches and a quarter diameter, and feven-eighths of an inch broad on its periphery, which is perforated with fmall holes for the water to pafs through into the fpiral conveyance.

M, The folid End of the Axis, to which is faftened a winch, with which the wheel is turned round to fhew the experiment.

P L A T E I, F I G. 2.

A View of the MACHINE, with its Side laid open to shew the Circumvolutions of the Spiral Conveyance, and the Holes through which the Water passes into the hollow Part of the Axis.

- A, The Pedestal.
- B, The Crotchet.
- E, The Glafs Tubes.
- K, The Wheel.
- M, The solid End of the axis.
- N, The Nut, with which the plates and wheel are pressed together.

This Machine was examined by the Committee of Mechanics, who was of opinion that Mr. Zeigler was deserving of the gold medal of the Society for his ingenious Spiral Water-wheel. The Committee recommended to the Society also, to present Mr. Valtravers with the Society's silver medal, for the trouble and expence he had been at on account of the said Machine; to which the Society agreed, January 6, 1768.

C H A P. V.

A Description and Explanation of the Model of Mr. WIRTZS's improved HYDRAULIC MACHINE, presented to the Society by RODOLPH VALTRAVERS, Esq;

P L A T E II. DIVISION 1. FIG. 3.

A perspective View of the improved WHEEL, which is one Foot seven Inches Diameter, two Inches broad, and one Inch and an half thick.

A, **A** Winch, with which the wheel is turned to shew the utility of the machine.

B, A Curved Brass Tube, soldered to the hollow end of the axis of the wheel; and to the innermost end of the spiral tube G.

C, A Scoop, or Bucket, fastened to the periphery of the wheel. This Scoop being filled with water at every revolution of the wheel, discharges its contents (as it ascends) into the outermost end of the spiral tube, and from thence through its different circumvolutions into the hollow part of the axis D, &c.

E, A Curved Tube, twelve inches and an half long, and three eighths of an inch diameter, with a short neck, turned up at right angles with the horizon : at the extremity of this Tube there
is

is fastened (in a perpendicular direction) a brass pipe, or set of tubes, elevated thirty feet above the axis of the wheel : the water is forced up through this pipe by the action and superior weight of the water contained in the circumvolutions of the spiral Tube G.

F, Part of the perpendicular Pipe, fastened to the neck of the curved tube B.

G, A Spiral Tube consisting of four circumvolutions, laid three a-breast on the periphery of the wheel : the whole length of this Tube, when laid out in a straight line, is somewhat more than the length of the perpendicular pipe, or tube.

This model was worked in presence of the Committee of Mechanics, who resolved to recommend to the Society to present Mr. Valtravers with the gold medal of the Society for procuring the said hydraulic model, and other repeated services ; to which the Society agreed, January 6, 1770.

PLATE II. DIVISION 2.

This division of plate the second contains a perspective view of Mr. Wirtzs's Hydraulic Machine, &c. taken from a drawing which Dr. Zeigler made of it, in its original state at Zurich, in Switzerland : the whole consisting of a perspective view of the Machine ; a plan of the spiral tube, or conveyance ; a section of the axis and perpendicular tube ; a view of the stage on which the Machine is erected, and of the Dye-house supplied with water by this ingenious contrivance ; the utility and description of which Dr. Zeigler has minutely set forth, in his Dissertation on the Zurich Acts, Vol. III.

CHAP.

C H A P. VI.

*A Description and Explanation of Mr. MERRYMAN'S
HYDRAULIC MACHINE.*

F I G. I.

*A perspective View of the MACHINE, taken from a Model made to
a Scale of three Inches to a Foot.*

A, **A** Small wooden Edifice, with an under and upper floor erected over the well pit, or pond, from whence the water is to be raised.

B, The under Floor, is one foot six inches square.

C, C, &c. Four Posts erected on the frame of the under floor. Their extreme length is fifteen inches and an half, and one inch square each.

D The upper Floor, is of the same dimension as the under floor.

E, E, E, E, Four Rails, twelve inches and three-fourths long, one inch broad, and half an inch thick.

F, F, F, &c. Eight Diagonal Braces, six inches and one-fourth long, half an inch broad, and three-eighths of an inch thick.

G, A Water Trough, fourteen inches long, four broad, and two inches deep.

H,

H, A Shute to convey the water from the trough to the place intended.

I, K, L, M, Four Pair of taper Trunks of different sizes, each pair are made to fit one into the other. The outside Trunks are all six inches long, but of different widths. The upper end of the Trunk I, is two inches and a quarter square; its under end is one inch and a quarter (inside measure.) The Trunk K, is two inches square at the top, and one inch at the bottom. L is one inch and three quarters square at the top, and three quarters of an inch at the bottom. M is one inch and an half at the top, and half an inch at the bottom. These Trunks being water tight, are fixed to the trough passing through its bottom, and also through the under floor into the water; the upper edges of the Trunks are fixed even with the edges of the trough; at the bottom of each of the outer troughs there is a thin brass valve (See Fig. 2.) which admits the water to rise when the inner Trunks N, N, &c. are lifted up by the cross beam O.

N, N, N, N, Four Forcers, or small Trunks, of the same shape as the outer trunks; but their dimensions are such, as to fill up the cavity of their respective outer trunks. These inner Trunks, or Forcers, are also made water-tight, but have no valves at their bottoms. A quantity of sand, gravel, or any other ponderous matter, is put into these Forcers, sufficient to sink them to the bottom of the outer trunks, when full of water; by which means the water is forced over the brims of the outer trunks into the trough G, and from thence conveyed off by the sheets H, to the place intended.

O,

O, The Lifting Beam, connected to the four forcers and the bottom of the mast Q, by chains, as represented in Fig. 1.

P, P, The Gauges or Guide-frames, are each fourteen inches and seven-eighths long, one inch and an half broad, and three-eighths of an inch thick ; mortised into the under and upper rails of the machine. In each of these Guide-frames, there is an aperture for the lifting beam O, to move freely up and down, in a perpendicular direction ; and in the edges of the said guide-frames, there are holes, with iron pins, to regulate the distance of the lifting beam. The under pins serve to prevent the sand trunks, or forcers, from descending so low as to bear on the valves of the water trunks ; and the upper pins are to prevent the mast Q, from yielding so much to the force of the wind, as to be thrown off from its basis.

Q, The Mast, two feet long, two inches in diameter at the bottom, and five-eighths of an inch thick at the top ; its upper part is round and taper, and the under part in the form of an hexagon : on each face, or side, is a quadrant, or segment of a circle, R, mortised into the foot of the Mast, and braced with six concentric braces 'T, T, &c. which are also mortised into the Mast, as represented in Fig. 1. Its curved basis being thus formed, its bearing point, or center of gravity, will vary in every degree of inclination of the Mast, by the pressure of the wind against the sail, &c.

R, R, &c. Six Quadrants, whose radiuses are each seven inches ; one end of each Quadrant is mortised into the foot of the mast,

maſt, and the other end is elevated four inches and an half from the ſurface of the upper floor.

S, S, Two Iron Rings, faſtened to the ends of the pole V, which turn looſely round the maſt.

T, T, &c. Six concentric Braces, mortiſed into the maſt and to the elevated ends of the quadrants. Theſe quadrants and Braces ſupport the maſt, with its fail, &c. and ſuffer it to incline to the horizon, more or leſs, according to the force of the wind.

V, A Pole, or Staff, one foot long, and half an inch in diameter. This Pole is connected to the maſt with two iron rings, which turn looſely round the maſt, but are fixed to each end of the pole.

U, A Sail, made of coarſe cloth, twelve inches ſquare, and faſtened with ſmall cord to the fail-arms.

W, W, The Sail-arms, one foot long, a quarter of an inch thick in the middle, and one-eighth of an inch at each end.

X, X, Two horizontal Trundles, two inches and an half long, and a quarter of an inch ſquare; theſe Trundles are inſerted into the pole V, diverging from each other one inch and an half at their extremities, where they are inſerted into the upper fail-arm.

Y, Y, Two curved Braces, two inches and an half long, and one-eighth and one-fixteenth of an inch diameter; theſe Braces are inſerted into the pole V, and the trundles X, X. By this ingenious contrivance, the fail, with its pole, turns with the wind to any point of the compaſs; and, by the action of the wind, and reaction of the ſand trunks, the maſt obtains a regular rolling motion; and
the

the number of trunks raised will be proportionable to the force of the wind ; that is to say, if it blows a gentle gale of wind, one or two sand trunks will be agitated ; if a stiff gale, the mast will incline more to the horizon ; and by that means give motion to a greater number of sand trunks, whose weight will counter-act the force of the wind, as before-mentioned.

F I G. 2.

a, A Section of the Water and Sand Trunks ; their dimensions, use, &c. explained in Fig. 1. See the letters I, K, L, &c.

b, The Sand Trunk, or forcer, with its fixed bottom.

c, An Iron Handle, fastened to the sides of the forcer, or sand trunk.

d, The Brass Valve, fastened to the bottom of the water trunk.

As this invention is quite new, simple, ingenious, and capable of improvement, the Society presented Mr. Merryman with a silver medal, February 26, 1766.

C H A P. VII.

*An Explanation of the Apparatus used by the DUTCH, in the
Turbot and Cod Fishery.*

A, A, &c. **T**anned Lines, made of the best materials, and as pliant as possible, so as not to be subject to kink ; they are from forty to fifty fathoms long each : sixteen of the Lines are under the care of each man of the crew, which generally consists of ten hands to each vessel.

B, B, &c. Hooks, with snoods fitted to them, about two feet in length, to be fitted to the lines, at the distance of about two feet from each other.

C, C, &c. Anchors with Wooden Stocks, weighing about eight pounds each : there is one of these to the end of every three lines ; the lines are to be made fast to the shanks of the Anchor.

D, A Buoy Rope for each anchor, about fifty fathoms in length. One end of this Rope is to be fastened to the ring of the anchor, and the other end to the buoy.

E, A light neat Buoy, with a Staff that goes through it. This Staff is about twelve feet long ; two thirds of which are above the head of the Buoy. On the top of each Staff is a piece of leather, or some kind of flag ; the mark of each to be different

in colour, or otherwise, so as to distinguish the first Buoy from the second, the third from the fourth, &c.

F, An Iron Strap, fixed to the bottom of the buoy-staff; having an iron swivel thereto, weighing about seven or eight pounds, which serves not only to take the kinks out of the buoy-rope, but also as a balance to keep the buoy-staff upright, and as a beacon to sail by from buoy to buoy, or to save the lines in case of their breaking.

G, A Tray, made of inch or three quarters of an inch deal, with iron clamps to keep it together. It should be about four feet seven inches long, and one foot nine inches wide, with beveling sides about five inches high, and the like at one of the ends; having some holes at the bottom to put sticks in, to receive the hooks for the more ready baiting them. This Tray is used to coil the lines in, when the hooks are baited, which by this means are ready for running when the lines are to be cast.

H, H, Hook-sticks, pointed at the ends to stick into the holes in the bottom of the tray, and cleft at the other end to receive the hooks, which are to be taken off from thence to be baited. This prevents the line from tangling.

I, A large round Wicker basket, for coiling the lines in, when they are haling in the fish.

K, A Small Grapling, with a double row of hook arms, with which each vessel is to be furnished, to creep for their lines in case of their breaking.

The Method of laying the Lines is as follows :

The vessel stretches on under an easy sail with the tide, but standing about four or five points athwart it. An able and dextrous hand attends at the stern, and receives the buoy rope and anchor with the lines fixed to them : which latter he veers away from the tray brought by the first man ; whose lines being near out, a second advances with another tray and the like apparatus, and brings the outer end of the line, to the inner end of the former : and they are veered out as the former, and so on till the whole are expended, and the last anchor let go.

When the vessel parts with the lines, which is generally about slack water, or on the turn of the tide, about eight thousand fathoms of line are laid and moored on the ground furnished with sixteen thousand hooks and snoods fastened thereto. The vessel then makes sail, and works up to the first buoy, endeavouring to be there ready, when the tide slacks again, to take up the line, dropping down upon it with an easy sail : and, as they haul in their fish, they throw them into the well, frequently without staying to disengage the hook by cutting the snoods. Each man tends his own lines, which he coils into the basket as they are hauled in ; and prepares them after at his leisure, by fresh baiting, and coiling them in the tray ready for the next occasion. In case of the wind shifting, they sometimes wait at the last buoy, taking the lines in at either end that may best suit.

In this manner, the Dutch likewise fish with long ground lines for cod-fish on the Dogger Bank, and other places ; by which they have great advantage over us, who use only eight single hand lines in each vessel.

The bait, which the Dutch use for catching cod in the above-manner of fishing, is the lamprey eels, which are tough, and will lay on the ground without rubbing off the hooks. They get these eels from the river Thames, at Brentford, where they are in great plenty, and sent annually (in the months of November, December, January, and February,) over to Holland, from sixty to ninety thousand alive in each vessel, while not one of them is used by our fishermen for catching cod fish.

N. B. It has been generally misunderstood, that the lamprey eel is also used by the Dutch as a bait for their turbot fishery : but the bait for the turbot fishery is the garr fish, called by some people the long-noses. The heads and tails are cut off, and then the bodies are split and salted.

The Dutch likewise use salted smelts ; both these kinds of fish having a shining skin, they allure the turbot. Mackarel and herrings are likewise used sometimes for this purpose.

N. B. Mr. Thomas Briant, rope-maker in Harwich, makes turbot-lines, snoods, and buoy-ropes, equal in goodness to the Dutch ; price of the lines two shillings each ; snoods ten shillings ; buoy-ropes four shillings and six-pence each. Turbot-hooks sold by Mr. Knight, of Crooked Lane, London, equal in goodness to the

the Dutch. Can-buoys and staff made by Messrs. Dell and Co. at Horsley Down, Southwark.

The garr-fish bait is in great plenty on the coasts of Kent and Suffex, and cured or salted by Mr. Chalk, sen. of Folkstone. It may be procured all along the coasts of the British Channel, in the months of April, May, June, &c. the anchors, &c. may be made by English workmen.

C H A P. VIII.

A Description and Explanation of Mr. WILLIAM BAILEY'S MACHINE for Boring Auger Holes; which may be of great Use to Ship and House Builders, common Carpenters, Mill-wrights, Wheel-wrights, and Pump-makers; and also for boring into the Ground for the Discovery of Minerals, &c.

PLATE I. FIG. I.

A perspective View of the MACHINE.

A, **A** Wooden Frame, twelve inches long, nine inches and an half broad, and one inch and an half thick.

B, A Treadle, or Foot-board, fastened with screws to E, the spindle of the wadler. The auger is forced into the wood by pressing the foot lightly on the fore end of the Treadle: its inner
end

end is loaded with a sufficient quantity of lead, stone, or some other ponderous matter at *f*, to draw back the auger when the foot is taken off from its fore end.

C, C, C, C, Four curved Pieces of Wood, which serve to strengthen the posts *D 1, D 2*.

D 1, D 2, Two Posts, mortised into the frame *A* : their extreme length is twelve inches and an half each, breadth one inch and an half, thickness three quarters of an inch.

E, An Iron Spindle, rivetted to the under end of the brass wadler *F* ; which, together with the wadler *F*, is actuated by the treadle *B*.

F, The Wadler, with its clasps, spring, screw, and pulleys, (see Fig. 2.) is actuated by the foot pressing gently on the treadle *B*, by which means the line *K*, being fastened to the wadler by the presser *G*, draws forward the auger *W*, with its shaft *Q*, and carriage frame *P, P* ; the shaft passing loosely through the crown-wheel *S*.

G, The Presser, consists of two flat pieces of iron, fastened together with a joint or hinge : the long or inner plate, is fastened to the wadler *F*, with two screws, as represented in Fig. 2. In the under end of the short, or moveable plate, there is an aperture, or opening, for a small steel spring, which serves to open the jaw of the Presser, and loosen the line, when the machine is to be set from one degree to another.

H, A winged Screw, which serves, occasionally, to open or press the jaw tight on the line *K*, when the machine is properly set to the degree required.

I, I,

I, I, Two Brass Pullies, fastened to the ears of the wadler F, for the line K to pass over.

K, A Line, or Cord, which passes over the pullies I, I, Y, Y, &c. intersecting over the ears of the wadler F, and fastened with iron pins O, O, to the end of the carriage frame, or cross bars P, P.

L, An Iron Pin, which passes through the winch post D 2, and serves to point out the degrees marked N 2, the semicircular frames or arched brass plate of the machine.

M, A Winged Screw, which serves to fix the machine, when set to the degree required.

N 1, N 2, Two arched Brass Plates, whose radiuses are four inches and an half each, three quarters of an inch broad on their rims, and a quarter of an inch thick on their periphery. These plates are fastened together with three turned pillars a, a, a. The distance between these Plates is one inch and an half : on the curved margin of the Plate N 2, there is an index to shew how to set the auger to any degree of elevation or inclination ; and, on its straight edge, or margin, there is a large notch, or opening, for the crown-wheel S, to pass through, and be in contact with the pinion V. On the curved margin of Plate N 1, there are nine brass pullies, on which the line K passes over, and intersects over the ears of the wadler, as before-mentioned.

O, O, Two winged Iron Pins, with a small hole in each of them for the line K to pass through. These pins, being a little taper, are easily fitted tight into the holes in the ends of the cross bars

bars P, P, of the carriage, and serve to draw the line to a proper tension.

P, P, The Cross Bars of the carriage frame, are one inch and an half long, half an inch broad, and a quarter of an inch thick. There is a jaw, or notch, in each end of these Bars, properly fitted to the ribs R, R, in the straight margin of the plates N₁, N₂. The shaft of the auger turns in these Bars, and is forced forward and backward by the pressure of the foot on the treadle B, as before mentioned.

N. B. One of the cross bars is not seen in the perspective view, being concealed by the crown-wheel S.

Q, The Shaft of the Auger, is four inches and ten-twelfths long, from shoulder to shoulder, and four-twelfths square, with a hole in its fore end to receive the shanks of the Auger.

R, R, A Rib, or Rabbet, in each of the straight margins of the arched plates N, N. These ribs sustain and direct the carriage with its shaft, auger, &c. in their progressive and regressive motions. One of the R's, is not seen in this view, being on the inside of the arched plate.

S, A Crown Wheel, actuated by the pinion V; it is two inches three-eighths in diameter, and has forty-eight teeth. Its axis is a brass collet, five-eighths of an inch in diameter, and five-eighths of an inch long; with a square hole through it for the shaft Q to pass and repass freely, by the pressure of the foot on the treadle B. The other surface of the collet is turned off round, and works in the cross brace P.

T,

T, A Brass Cock, fastened with wood screws to the post D 2. The axis of the pinion V, and also the axis or center pin of the arched plate N 2, both turn in the hole e, of this cock. See Fig. 3.

V, A Brass Pinion, one inch three-sixteenths in diameter, and five-twelfths of an inch broad on its periphery, with twenty-four teeth. One end of its axis works in the brass cock T, and the other passes through the post D, and is actuated by the winch Z.

U, An Iron Pin, which serves to regulate the depth of the hole, by moving it to the different holes in the straight margin of plate N 2.

W, An Auger, properly fitted to the square hole in the end of the shaft Q.

X, A Screw, with which the auger is fastened to the shaft Q.

Y, Y, &c. Nine Brass Pullies, fastened with screws to the arched plate N 1.

Z, The Winch, with which the auger is worked.

a, a, a, Three Brass Pillars, screwed to the plates N 1, N 2.

f, A Lead, or Stone Weight, fastened to the inner end of the treadle.

F I G. 2.

E, The Spindle of the wadler F.

F, The Wadler.

N n

G, The

G, The Presser, with its spring.

H, The winged Screw, with which the presser is forced tight to the line K.

I, I, The Pullies of the Wadler.

F I G. 3.

Part of the plate N 2, with its axis d, which turns in the hole e, in the brass cock T.

F I G. 4.

T, The Brass Cock, which contains the pinion V.

e, The Hole, in which the pivots of the pinion V, and of the arched plate N 2, revolve.

F I G. 5.

V, The pinion, with its winch Z.

C, The Pivot of the Pinion, which turns in the hole e.

Every person who makes use of an auger, the usual way, knows by experience, that he never can so properly exert his strength in this operation, as when he bores down perpendicular, with his body leaning over his work; and it is very evident, that every degree of elevation of the auger from the aforesaid direction, his power is diminished and of less effect, consequently his labour will

will be greater, and his work proportionably retarded, infomuch that a man can bore four holes at least with the auger down perpendicular, in the same space of time he can bore one with much less trouble in the contrary direction; but with this machine, the force and dispatch is equally the same in all directions; it is certain, also, that the action of the auger, in the usual way of boring, is discontinued twice in every revolution; but with this machine its motion is continued with equal force and velocity, till the auger has bored to the depth required. Another defect in the common method is, the unsteady and irregular motion of the auger at its first entrance into the wood, by which the holes are bored very crooked and most commonly larger without than within, and very wide of the direction or point aimed at, especially if the wood proves hard and knotty, and likewise when the holes are bored of any considerable depth in the wood. There is also a great deal of loss of time and trouble in picking the wood with a gouge before it can be pierced with the auger; but all these defects are entirely obviated by the aforesaid machine, which was examined by the Committee of Mechanics, who was of opinion that the several defects in the common method of boring auger holes are remedied by Mr. William Bailey's machine and method of working; and it appeared to the Committee, that his machine will answer the end proposed of boring auger holes in ships, &c. more commodiously and advantageously than by the common methods: therefore it was the opinion of the Committee, that Mr. Bailey merited a bounty of fifty pounds for his invention of the aforesaid machine; to which the Society agreed, February 25, 1761.

C H A P. IX.

*A Description and Explanation of Mr. PHINEAS COOKE'S new
constructed Spiral Auger.*

F I G. I.

A short View of the Auger.

A, **T**H E Head of the Auger, in which there is a round hole one inch and a quarter diameter, to receive the drift or wooden handle which turns the auger.

B, The Shank of the Auger, is six inches and an half long, and five-eighths of an inch square at its upper end, having its edges or angular points taken off.

C, An endless Screw, with a double worm or thread a quarter of an inch thick, and flat on their edges; these worms cut two spiral chips which pass through the two concave spiral channels of the auger, and are gradually discharged therefrom without drawing out the auger till it has bored a hole full three feet deep, or any other depth required.

D, The Point of the Auger, is a taper screw with a double worm like a gimblet, which pierces the wood much easier and truer than common augers, and requires no picking with a gouge, which in the usual method is an unavoidable operation attended with a great deal of trouble and loss of time. It has been
proved

proved by repeated experiments, that this instrument does not want to be drawn out of the wood to discharge the chip, which is also the occasion of much labour and loss of time in boring with a common auger, as the accumulated chip in its cavity must be taken out every four or five inches of wood bored therewith.

A trial of this new constructed auger was made in fir, oak, beach, and mahogany, in presence of the Committee of Mechanics, who was of opinion that it effectually answered the purpose of discharging the chip during the time of boring; that it works more freely, is withdrawn more easily than common augers of the same bore, and promises to be a tool of great use in ship-building, &c. It was therefore resolved to recommend to the Society to give a bounty of thirty guineas to Mr. Cooke, for his invention, he leaving the instrument with the Society for the use of the public; to which the Society agreed, May 1, 1770.

C H A P. X.

F I G. I.

A front View of the PISTON of Mr. BLANDFORD's Pump.

A, **A**N Iron Pin, or Joint, to which the staff or brake of the pump is fastened, and is the center of its motion.

B, A square Iron Rod, whose under end is rounded off and fitted tight into a hole bored through the piston, to which it is fastened with an iron key F, through an aperture in the under end of the said Rod.

C, A round Plate of Brass, or Iron, one inch diameter, and a quarter of an inch thick, with a round hole in the middle of it for the under end of the rod to pass through; this Plate is forced up tight against the shoulders of the rod B, by the iron key F, by which means the piston E, is very easily taken off and on, and well fastened to the rod, and the leather cap D, pressed so close to the middle of the piston, as not to yield too much to the force of the water, as it passes the cavities of the piston.

D, A round Piece of Leather (properly dressed for the purpose) fitted so full to the circumference of the piston, as to fill up the tube, or hollow cylinder, in which it works.

E, A Piston, made of wood, five inches and an half long, with four concave channels for the water to pass through; by this ingenious contrivance the water passes through the piston and box
with

with much less obstruction than it does through common pistons, &c. it is worked with less friction and the leather less liable to wear; and by the experiments made with this new Piston and box before the Committee, it was found that they are less liable to be obstructed by lumps of coal, stones, chips, &c. it is very evident, also, that they are much sooner taken in and out, and more easily leathered and repaired, than common pistons, &c. and it is very probable that, if this new constructed Piston was to be made of cast brass, instead of wood, it would be a considerable improvement to this useful invention.

F, An Iron Key, or Wedge, driven through an aperture in the under end of the rod B, and serves to fasten the piston tight to its place.

F I G. 2.

A Plan of the Box, made on the same Principle as the Piston.

G, The Box, is five inches diameter on the face, or upper side, four inches and three-eighths at the bottom, and three inches and three-quarters long.

H, The End of the Iron Pin and Key, with which the leather cap is fastened to the box.

E, One of the concave Channels of the box.

F I G.

F I G. 3.

B, A Section of the Rod.

E, The Piston, represented with its round plate, or leather cap, to shew its face, or upper side.

This Pump was tried several times with a common pump, at the Society's office, in presence of the Committee of Mechanics; and, at the last trial, it appeared to the Committee, at the close of the last experiment, that the pump of the old construction was entirely choaked, and the leather quite worn through so as not to be worked, and that the new-constructed Pump was worked with ease. The Committee, therefore, resolved to recommend to the Society, to give Mr. Blandford a bounty of thirty guineas for his new-invented Piston and Box, he leaving the same with the Society for the use of the public. To which the Society agreed, March 14, 1770.

C H A P.

C H A P. XI.

A Description and Explanation of Mr. DELIVITZ'S
DOOR HINGE.

F I G. I.

A View of the HINGE with all its Parts put together.

A, **A** Brafs Socket, or Tube, seven inches and eight-twelfths long, (exclusive of the ball and acorn C,) and seven-twelfths of an inch diameter, inside measure. This Socket, with its wing B, is made of one entire piece of plate brafs, which being divided breadthwise into three equal parts, the middle division, when properly bended, makes the Socket or Tube A; and the two outside divisions, when doubled together, make the wing B, whose breadth is one inch and an half, and thickness about one-eighth of an inch.

B, The two outside Divisions of the Brafs Plate, which being doubled together are in contact with each other, as before-mentioned; these divisions are cemented together with soft solder, and perforated with three holes for wood screws to fasten to the door.

C, C, Two ornamental Balls and Acorns, two inches and an half long, including their shanks, indicated by the dotted lines at the end of the socket: their diameters are three-fourths of an inch. These Ornaments are made of cast brafs, turned in a

O o

lathe

lathe, and fitted tight into the sockets, to which they are cemented with soft folder.

E, A fixed Ratchet Roller, two inches and six-eighths of an inch long, exclusive of its short cylinder, or gudgeon, I; this fixed Ratchet-Roller is inserted into the socket of the under wing, and fastened thereto with soft folder, and an iron pin through the socket and cylinder, as represented in Fig. 6.

F, A spiral Steel Spring, inserted into the socket A; its thread or worm is four-twelfths of an inch broad, and consists of sixteen circumvolutions extending from one end to the other of the socket; its upper end is capped with an iron plate, in which there is a square hole to receive L, the shank of the ratchet-roller E; this shank sustains the upper end of the screw, and prevents it from turning in the socket when it is actuated by the moving socket A, with the opening of the door.

G, The Spindle or Axis of the click spring, passes through a small hole in the nut of the click, projecting three-sixteenths of an inch beyond it, and fastened to the fixed wing with two small staples, as set forth in the description of the click-spring D.

H, A small Steel Clamp, let in even with the surface of the fixed wing, and rivetted thereto as a stay to the spring, &c.

I, The short Cylinder, or Gudgeon, of the upper end of the ratchet-roller, is inserted into the mouth of the upper socket M, Fig. 2. This socket is supported on the shoulder of the under socket, and the upper end of the cylinder I, which, with its wing, &c. is fastened to the door case, and is the gudgeon or center on which it turns.

K,

K, The Shank of the Cylinder, six inches three-fourths long, and four-twelfths of an inch thick ; the Shank passes through the spiral spring and its socket, leaving a small interval between the spring and the Shank.

L, The upper End of the Shank, is flattened and properly fitted to the square hole in the cap of the spiral spring F ; its use is to prevent the spring from turning in its socket when actuated by the opening of the door, which motion is counteracted by the elastic power of the spring ; which elastic power may be made greater or less according as the spring is raised or twisted up by the ratchet roller and its click.

M, The Mouth, or under End of the door-socket, &c. turns on the upper end of the cylinder I, resting on the shoulder or upper end of the fixed door-case socket and wing N.

N, The inner End of the spiral spring, bended at right angles with the shank and socket, and let into an opening or aperture in the under end of the wing B, which wing and socket moves with the door, and by the elastic power of the spring is thrown fast as afore-mentioned.

This new invented door hinge was examined by the Committee of Mechanics, who resolved that Mr. Delivitz was deserving of a bounty of fifteen pounds ; to which resolution the Society agreed, Feb. 3, 1768.

N. B. This hinge has been applied to the Committee room door of the Society, and has been in constant use ever since the year and month above-mentioned, and fully answers the purpose for which it is intended.

C H A P.

C H A P. XII.

A Description and Explanation of Mr. JOSEPH JACOB's new-constructed CARRIAGE SPRINGS.

A, B, **T**WO Spiral Springs, whose actions and elastic powers are united by an horizontal steel bar.

C, An horizontal Steel Bar, connected to the spiral springs, the shackles F, F, &c.

D, D, Two Steel Arms, whose upper ends are fastened to the inner ends of the spiral springs, or plates, A, B, and their under ends to the bar C.

E, E, Two curved Iron Supporters, with eyes, or holes, in their upper ends, to receive the ends of the bar C.

F, F, Two Shackles, that receive the braces to which the body of the carriage is suspended; these Shackles being depressed by the weight of the carriage, the springs A, B, are thereby uniformly wound round the bar C.

G, H, The Frame of the Carriage, to which the springs and the curved supporters are fastened.

I, I, Two Steel Arms, fastened with feathered keys to the ends of the bar C, and the shackles F, F.

According to the common construction of coaches, &c. the body is suspended on four springs, independent of each other; by which means it frequently happens, from the different position
of

of carriages, on oblique planes, or sudden passing over rough and uneven ground, that one or other of the springs are subject to almost the whole weight of the body of the carriage; consequently, if each of these four springs be proportioned only to a fourth part of the weight of the body, that spring on which almost the whole weight falls, must be overpowered; or, if it be equal to the weight sustained, it must cease to act as a spring, when only charged with a fourth part of the whole weight. The new-invented springs before-mentioned, are altogether free from those inconveniencies; as each spring, in every position, must necessarily bear an equal proportion of weight. This will appear very evident, from the following observations: if the whole weight which the two springs A and B are capable of sustaining, be suspended on the shackle F of the spring B, the spring A will have an equal proportion of the weight, and be uniformly wound up with the spring B; and if by any accident one spring should fail, the other would support the body of the carriage, without any alteration in the position of it; or should both springs happen to fail, the shackles F, F, with the braces, would rest upon the curved supporters E, E, and the body of the carriage remain perfectly upright, safe and secure.

N. B. The play of the springs is easily regulated for any weight, and the temper or elastic power of them regulated, by lengthening, or contracting, the arms D, D, and I, I, to which the springs and shackles are connected.

A model of Mr. Jacob's carriage springs, and also a set of large springs of the same construction, now in use in a gentleman's carriage,

carriage, were examined by the Committee of Mechanics, who was of opinion that the application of the springs, in Mr. Jacob's wheel carriage, is new, simple, ingenious, and safe : they resolved, therefore, to recommend to the Society, that twenty guineas be given to Mr. Jacob, he leaving his model with the Society for the use of the public : to which the Society agreed.

C H A P. XIII.

A Description and Explanation of Mr. ABRAHAM STAGHOLD's new constructed Jack.

F I G. I.

A Front View of the Jack.

A. **T**HE Pedestal, or Stock of the Jack, is two feet two inches long, seven inches broad, and four inches and three quarters thick ; in the middle of this Pedestal there is a round hole one inch and seven-eighths diameter, in which the under part of the screw G, is inserted, and moved freely up and down with the winch I, Fig. 3.

B, An endless Screw, with a double worm, or thread, three inches and an half long, from shoulder to shoulder, and one inch

inch and an half diameter ; the pivots of the Screw turn in two iron plates fastened to the head of the pedestal.

C, An Horizontal Screw Wheel, four inches diameter, and five-eighths of an inch thick, with ten spiral teeth on its periphery ; this Wheel, and the socket, or hollow cylinder E, are made of one entire piece of iron ; the whole being a box, or female screw, which revolves round the lifter, or screw G, which together with the Wheel C, is put in motion by the endless screw and winch B, I.

D, A Piece of Brass three inches diameter, and half an inch thick with a hole in the middle of it one inch and seven-eighths diameter, for the screw G to pass freely through. This piece of Brass sustains the screw-wheel C, box E, screw G, and whatever weight is to be raised on the points H, and K.

E, A Box, or hollow Cylinder, two inches and five-eighths long, and two inches and one-fourth diameter ; this Box is a female screw which revolves round the screw G, and is actuated by the winch I, as before-mentioned.

F, An Iron Tube, brazed to the iron cap of the pedestal, projecting five-eighths of an inch above it, and one quarter below it ; this Tube serves to guide the screw G, as it moves up and down.

G, A perpendicular Screw, or Lifter, two feet long, and one inch and three quarters diameter, having a double worm, or thread, and an holdfast on its upper end.

H, A Steel Holdfast, with four angular points, or claws.

FIG.

F I G. 3.

I, A Winch, whose radius is nine inches and an half.

F I G. 2.

K, An Holdfast, welded to the under end of the perpendicular screw, or lifter; this Holdfast works on the side of the machine, projecting two inches and an half therefrom, and is guided by a channel, or aperture, cut through the side of the pedestal.

L, L, Two angular Points, driven into the bottom of the pedestal to keep it steady on the ground.

This Machine was examined by the Committee of Mechanics, who was of opinion that Mr. Staghold's Jack is a very ingenious contrivance, and likely to answer the purposes to which such machines are applied, more effectually, and with greater safety, than those commonly used: the Committee resolved, therefore, to recommend to the Society to give Mr. Staghold a bounty of ten guineas, he leaving the model of the said Jack with the Society for the use of the public; and ten guineas more on his delivering a Jack, at large, to the Society: to which resolution of the Committee the Society agreed, January 9, 1771.

C H A P. XIV.

A Description and Explanation of the Reverend Dr. HALE'S Ventilator.

F I G. I.

A perspective View of the Machine, with its Side laid open, taken from a Model made to a Scale of one Inch to a Foot.

A, **T**HE Pallet, or Midriff, is eleven inches and two twelfths long, five inches and a quarter broad, and three-eighths of an inch thick, fastened with hinges to the valve frame, or partition, between the outer and inner wind chests K, L. This valve is actuated by the horizontal lever B, and perpendicular brass rod C.

B, The Lever, fourteen inches long, half an inch broad, and a quarter of an inch thick. The distance from its fulcrum, or center pin, to the center of the lifting rod, is seven inches and an half, and from thence to the extremity of its handle, five inches three fourths.

C, A Flat Brass or Iron lifting Rod, five inches long, half an inch broad, and one-eighth of an inch thick, connected to the lever, and the pallet, or midriff, to which it is fastened with two iron pins. This Rod passes through an aperture in the upper board, and sliding valve, and wooden cap fixed thereon.

P p

D,

D, An Octagon Post, three inches and an half long, and five-eighths of an inch thick, erected on a traverse fastened to the upper board of the inner wind chest. In the upper end of this Post, there is a mortise with a hole through it for an iron pin, or fulcrum, for the lever to work on.

E, A thin Brass Slider, three-fourths of an inch long, three-eighths of an inch broad, and one-sixteenth of an inch thick. This valve runs in a square wooden cap fastened upon the end of the upper board of the wind chest; in which upper board, and likewise in the valve and wooden cap, there is an aperture for the lifting rod to pass through; but the apertures in the upper board and cap are nearly twice the length of that in the valve. The valve is of no other use than to prevent (as much as possible) the wind from escaping through the aperture of the upper board, by the central motion of the lever and lifting rod.

F, F, Two Spouts, or Trunks, two inches and an half long, and one inch and a quarter square, inside measure; each of these Spouts are fitted into a pannel which runs in a rabbet, and by the shifting of them, end for end, the wind may be occasionally drawn in through the horizontal spout, and forced out of the perpendicular spout, or *vice versa*.

G, G, The sliding Pannels, to which the spouts are fixed, and occasionally turned end for end.

H, The Valve Frame, or Partition, between the two wind chests.

I, I, I, I, Four Valves, two inches and a quarter long, and one inch and an half broad, and one-eighth and one-sixteenth of

an

an inch thick ; these Valves are leathered, and fastened to the Valve Frame, and alternately open and shut as the pallet, or midriff, moves up and down.

K, The inner Wind Chest, whose inside dimensions are five inches and two-twelfths long, and four inches deep.

L, The Stopper of the outer Wind Chest.

M, The Inside of the End Stopper is excavated, as indicated by the dotted lines on the side of the chest, to prevent the wind from escaping by the central motion of the pallet, or midriff.

F I G. 2.

H, The Valve Frame, five inches and three-eighths long, four inches broad, and a quarter of an inch thick.

I, I, I, I, The Valves.

K, The inner Wind Chest, five inches and three-eighths long, two inches and seven-eighths broad, and four inches deep.

This model of Dr. Hales's Ventilator was presented to the Society by Mr. Thomas Yeoman, for which he had the thanks of the Society, November 30, 1768.

C H A P. XV.

*A Description and Explanation of a Machine for ventilating Mines,
taken from a Model, presented to the Society by KEANE
FITZGERALD, Esq; F. R. S.*

P L A T E I. F I G. 1, 2, 3, 4.

*An Elevation of the Machine, with some of its Fixtures taken off;
and the Arms of the Fly represented broken, to shew the Connec-
tion of the Movements which are all made to half the Dimensions
of the Model.*

A, **A**N arched Lever, the first mover, whose radius is two inches and seven-eighths; this Lever gives motion to the spur wheel B, &c.

B, A Spur Wheel, two inches and three-eighths diameter; this Wheel, with its ratchet, &c. turns loosely on its arbor, and is actuated by the retrograde motion of the arched lever A.

C, A Spur Wheel, two inches and a quarter diameter.

D, A Spur Wheel, one inch and five-twelfths diameter.

E, A Ratchet Wheel, ten-twelfths of an inch diameter, fastened to the spur wheel D.

F, A Ratchet Wheel, three-fourths of an inch diameter.

G, The Click of the ratchet wheel E, fastened to the frame of the machine.

H,

H, A Pinion Wheel and Fly I, I, I, I, actuated by the spur wheel B; the arbor of this Pinion is a crank, which gives motion to the horizontal rod N, and the perforated lever P, which works the ventilator. See Fig. 3.

I, I, I, I, The Fly, fixed to the arbor of the pinion.

K, A Spring, fastened to the spur wheel B, revolves with it, and forces its click against the ratchet wheel F.

L, The Click of the Ratchet Wheel F, fastened as before-mentioned to the spur wheel B.

M, M, Two Pinion Wheels, one is five-eighths of an inch, and the other three-eighths diameter; these Pinions are fixed on one arbor, which passes through a hole near the edge of the Wheel B, and is fixed thereto with its small Pinion, connected to the Wheel D, and the other connected to the Wheel B.

N, An Iron Rod, connected to the crank and the perforated lever, which works the ventilator.

O, The Arbor of the pinion and fly, I, I, &c.

P, The perforated Lever, which works the ventilator.

Q, A Brass Collet and center Pin, with which the lever is fixed to the post R.

R, A Post, to which the lever of the ventilator is fixed.

S, An Iron Nut, with which the fulcrum or center pin of the lever is fixed to the post.

T, One of the Brass Cocks, in which the fulcrum of the arched lever turns.

U, The Cap of the Post.

V,

V, A round handle, with which the lever is worked to shew the different movements of the machine.

W, A square Piece of Wood, to which the model of the machine, and the perpendicular post R, are fixed.

PLATE II. FIG. 5.

A, The arched Lever.

B, The Spur Wheel, actuated by the arched lever.

C, The Spur Wheel, that actuates the pinion, fly, &c.

D, The Spur Wheel.

E, A Ratchet Wheel, fastened to the spur wheel D.

F, A Ratchet Wheel, three quarters of an inch diameter.

G, The Click of the ratchet wheel E.

H, A Pinion Wheel.

I, I, &c. The Fly.

K, The Spring of the click of the ratchet wheel F.

L, The Click of the ratchet wheel F.

M, M, Two Pinion Wheels, one in the front, and the other at the back of the spur wheel B; these Pinions are fixed on one arbor, and are connected to the spur wheels B and D, as before-mentioned.

N, An Iron Rod, connected to the crank O, and the lever P.

Q, A Brass Collet, with which the perforated lever is fixed to the post R.

R, The Post.

S,

S, The Nut of the center pin, or Fulcrum of the perforated lever.

T, T, Two Brass Cocks, which sustain the fulcrum of the arched lever.

U, The Cap of the post.

V, A round Handle, fastened to the end of the arched lever.

W, A square Piece of Board, to which the model is fixed.

X, X, Brass Pillars, with which the principal fixtures of the model are fastened together.

Y, The Spur Wheel, fixed to the back part of the wheel B.

N. B. A more particular account of this curious machine may be seen in the Philosophical Transactions, Vol. L. Part 2.

E N D O F B O O K VII.

B O O K VIII.
M E C H A N I C S;

C O M P R E H E N D I N G

A Short Account of such Mills, Models, and other Machines in the Society's Repository, as are not yet delineated.

C H A P. I.

*A Short Account of a HAND MILL for grinding Corn,
by Mr. JOHN GORDON.*

I. **I**N Consequence of the Society's Premiums, there were twenty-two Hand Mills of various sorts produced. The Committee appointed to examine them was very deliberate and circumspect in their examination of them ; and, after repeated trials,

trials, and mature confideration, they came to a refolution that Mr. Gordon's Mill, with ftones thirty-three inches diameter, was preferable to the other ftone Mills. To which the Society agreed, January 11, 1758.

C H A P. II.

A fhort Account of a STEEL MILL, for Grinding Corn, by
Mr. PETER LYON.

THE Committee came to a refolution that Mr. Lyon's Steel Mill, five inches and three quarters diameter, was fo nearly equal in merit to Mr. Gordon's Stone Mill, that it was difficult to diftinguifh which was the beft ; it was therefore propofed to divide the premium of fifty pounds between the two candidates ; to which propofal they readily agreed, and the Society confirmed the refolution of the Committee, January 11, 1758.

C H A P. III.

A short Account of a HAND MILL for grinding Corn, by
Mr. SAMUEL PARSONS.

THE Committee appointed to inspect and examine the structure of the Hand Mills, caused very accurate trials to be made of them in the presence of several mealmen and others, who were proper judges of this matter; who, after several trials, declared that the Stone Mill of thirty-three inches diameter, made by Mr. Parsons, was preferable to the others, both as to goodness of the meal, and expedition in working. This determination entirely coincided with the sentiments of the Committee, who were unanimously of opinion that Mr. Parsons was intitled to the premium of fifty pounds. The resolution of the Committee was confirmed by the Society, December 6, 1758.

C H A P.

C H A P. IV.

A short Account of a H A N D M I L L, by Mr. CHARLES LLOYD.

TH E Committee of Mechanics read the description of Mr. Lloyd's Mill, and also his calculations of its performance with stones of various sizes, from fourteen to five inches diameter. This Mill is worked by a winch of seventeen inches radius, carries on its axis a crown wheel of forty cogs, a lantern of ten inches, whose axis, or spindle, carries the middle stone, whose velocity to the winch is as four to one: so far the construction is in the common way; but further, there is fixed round the stone (and moving therewith in the same plane) an horizontal fly of twenty-three inches and an half diameter, whose rim, or periphery, is a cavity in six divisions, so contrived as to carry a quantity of lead-shot, proportionable to the diameter, or weight of the stone, by which means the inventor proposes to supply the dimensions in the size and weight of the stones, by adding a proportionable quantity of shot in the cavity of the horizontal fly; by which he apprehends that the following advantages arise from the application of the said hollow fly, (viz.) First, Being firmly fixed round the moveable stone, it gives an accelerated motion, (the common effect of all flies.) Secondly, It lends its weight to the stones, being fixed thereto as if it were part of the same, by which he supposes that its additional weight makes up for the diminution of
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its bulk. Thirdly, As it moves in the same plane with the stone, its weight and diameter outreaching that of the stone, preserves so just a balance, that it will not suffer the stone to be lifted up, by any accident, higher on one side than the other; and thereby strained or thrown out of a true parallelism.

The Committee found by repeated trials and experiments, that the calculations which Mr. Lloyd had laid before them were very just and satisfactory; it was therefore the opinion of the Committee that he was deserving of a bounty of fifty pounds; and as it appeared to them, that he had been at sundry great charges in bringing the Mills from Wales, and a long attendance in town; the Committee, in consideration of his great merit, recommended to the Society, to allow him the sum of twenty guineas for the said expence, on condition that he left with them the Mill, and all the different stones, &c. which had been used in the said Mill.

This resolution of the Committee was confirmed by the Society, March 25, 1761.

C H A P. V.

*A short Account of a H A N D M I L L, made by
Mr. WILLIAM BAILEY.*

THIS Mill was made by order of the Society ; and constructed on the same principles, and of the same dimensions as the Mills used by the peasants in France. The original from which it was made was brought from St. Cas, by his late R—l H—s the D—e of Y—k.

The improvements which Mr. Bailey made to it, are as follows, (viz.) First, A stopper with a wedge, on which is a scale or index, to regulate the feeding of the Mill. Secondly, A lever with a scale and screw, to regulate the fineness of meal. Thirdly, The nut is a frustum of a cone, six inches diameter at the base, and four inches at the vertex ; this nut works on two centers, by which means it turns more regularly and much easier than the St. Cas Mill, which turns only on one, which is the occasion of its making bad work, and being frequently out of order.

These improvements were examined and approved of by the Society, April 11, 1760.

C H A P. VI.

A short Account of Mr. NICHALLS'S TIDE MILL.

IN consequence of the Society's premiums for Tide Mills, there were nine models produced, but as two of the candidates had not complied with the terms of the advertisement, their models were rejected by the Committee appointed to examine them. The other seven models were minutely examined, and after repeated trials, the preference was given to the model made by Mr. James Nichalls, of Lambeth; but as the model made by Mr. Richard Lewis, appeared to have some merit, the Committee signified to Mr. Nichalls, that if he would give Mr. Lewis twenty pounds out of the fifty, it would be agreeable to them, though they had adjudged the premium of fifty pounds solely to him, to which recommendation of the Committee, Mr. Nichalls readily consented, and the premium was divided accordingly; to which the Society agreed, April 23, 1760.

C H A P. VII.

*A short Account of a Model of a TIDE MILL, by the Rev.
Mr. HUMPHREY GAINSBOROUGH, of Henly upon Thames,
Oxfordshire.*

THIS Mill is constructed on the following principles. First, A water wheel, two feet diameter, including the floats which are ten in number; a crown wheel, one foot diameter, with eighty cogs; these wheels are raised and lowered in the water (as the tide ebbs and flows) with a double lever arched at each end; its fulcrum or pivots being two-thirds of the moving power, at the extremity of which a stronger iron chain is fastened for raising and lowering the water wheel, &c. Secondly, There are flood gates which regulate, at any degree, from high to low water; the aperture, or issue of water, being proportioned to the floats and force of the water required. Thirdly, there is a contrivance at the head and tail of the Mill, which occasionally makes a fall of water to each. Fourthly, A sliding lantern pinion, with eight trundles on a perpendicular shaft, on the top of which shaft or spindle, is a spur wheel intended to turn two pair of stones; this lantern wheel is made to slide occasionally from the upper side to the under side of the crown wheel, by which means the stones are at all times turned the same way, though the water wheel turns backwards and forwards with the flux and reflux of the tide. Fifthly, This Mill has a false bottom, or fence board, which is raised or lowered

lowered with the water wheel, by which the dead water under the float wheel is conveyed off by a sort of whirl-pool.

The Committee came to a resolution that Mr. Gainfborough was deserving the whole premium of sixty pounds ; this resolution was agreed to by the Society, June 1, 1761.

C H A P. VIII.

*A short Account of a Model of a TIDE MILL, by the Rev.
Mr. ROBERT LORD.*

THE Committee took into consideration Mr. Lord's Tide Mill, constructed on two caissons ; the water wheel works both with the flux and reflux of the tide ; the whole Mill rises and falls therewith.

This Mill, by means of two face wheels (fronting each other) shifts on its axis to work alternately the crown wheel, so as to turn the stones constantly the same way, though the water wheel changes its motion with the tide.

It was the opinion of the Committee, that the inventor of this Mill was deserving of a bounty of ten guineas ; to which the Society agreed, May 21, 1764.

C H A P. IX.

A short Account of a Model of a T I D E M I L L,
by Mr. WILLIAM COULTHARD.

THough this Mill is constructed much on the same principles as some of the other Mills, the Committee was nevertheless of opinion, that it had a great deal of merit, as it had many very ingenious and useful contrivances, particularly for drawing the flood-gates, which Mr. Coulthard has done two different ways, and in such a manner, as at all times slowly and gradually to enlarge the aperture for the issue of water proportionable to the height or fall of the head of water; by this means a just uniform motion is obtained, and the impetus of the water on the floats of the wheel is greatly regulated.; the whole machine works truer, and is less liable to wear and be out of order. The manner of drawing the flood-gate, &c. is as follows, (viz.) at one end of the main shaft of the water wheel is an endless screw, that turns a skew wheel on a long shaft; at the end of which long shaft is also an endless screw, which gives motion to another skew wheel, whose axis serves as a small roller to wind up a rope and communicates with a grooved bar, on whose axis is a pinion which works a rack, that is fastened to, and moves with the flood-gate, by means of the aforesaid rope wound round the barrel and roller.

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Here follows the candidate's other method of drawing the flood-gates, &c.

This is done by a buoy, or a float, with a perpendicular rod, which communicates with a lever, whose short radius gradually raises the flood-gate as the head of water, and the float sinks under the long radius of the lever. This flood-gate (like that with the endless screw) has a rack fastened to the back of it; this rack is actuated by the segment of a circle made of wood, with teeth on its periphery, and well fastened to the end of the short radius of the lever.

The flood-gate is raised more or less as need requires, by moving the float with the perpendicular rod, nearer or farther from the fulcrum of the lever; for which purpose there are holes at proper distances, both in the lever and rod. The inventor of this machine has also contrived a regulating flood-gate, which admits of twelve feet head of water to the Mill, then shuts again of its own accord to prevent the tide from overflowing the country.

The Committee was of opinion to recommend to the Society to purchase the model, at a price not exceeding twenty pounds, to which the Society agreed, May 12, 1762.

C H A P. X.

A short Account of two WIND MILLS for draining Land, and a spiral Scoop Wheel and a Trough, presented to the Society by — COLLIER, Esq.

THE first model consists of four water mills, with twenty-four scoop buckets on each wheel.

This machine is worked by the wind, having six angular sails, set to an angle of forty-five degrees, and is constructed much on the same principles as common wind mills; the wind shaft carries a crown wheel which gives motion to a trundle head, fixed to the perpendicular shaft; at the under end of this shaft is fixed a crown wheel, which turns two trundle heads, fixed to the shafts of the water wheels; each shaft carries two water wheels.

The second machine consists of only one water wheel, which is also worked by the wind, with the sails of an equal breadth from end to end. This water wheel carries twenty-four scoop ladles, which revolve in a trough, and include about a fifth part of the wheel; the sides and bottom of this trough are fixed so close to the ladles, as just to let them pass without touching the bottom or sides of the said trough, by which means the ladles answer nearly the same purpose as the scoop buckets in model the first.

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The scoop wheel and trough are made to a larger scale than either of the models above-mentioned, in order to shew by actual experiments the utility of the four scoop wheels in the first model.

C H A P. XI.

A short Account of Mr. NICHALLS's Model of a WIND MILL.

THE Committee having examined the two Wind Mills produced in consequence of the Society's premium for that article, they were of opinion that the model made by Mr. Joseph Nichalls, had great advantage over the mills in common use, as it worked four pair of stones on the ground floor, and its cap, or roof being an open frame, gave free passage to the wind, which in common mills is obstructed. They therefore recommended to the Society to give Mr. Nichalls the whole premium of fifty pounds, to which the Society agreed, April 23, 1760.

C H A P. XII.

A short Account of a Model of a WIND MILL with Springs, by Mr. RICHARD LEWIS, of Bow, in Middlesex.

THIS Mill is made with four points, or sails, of one uniform breadth; the surface opposed to the wind is a little concave; the length of its radius (in its full magnitude) is thirty-five feet six inches; the length of the sails thirty-one feet; the vanes of this Mill turn on hinges, with springs of wood, fastened to each of the arms of the wind shafts. The springs are intended to keep the vanes to their proper angles, or situation, and the force of them must be equal to the quantity or pressure of the wind the arms are capable of bearing; and if it blows harder, the springs yield to it, and suffer the vanes to turn their edges thereto, and by that means evade the force of the wind.

The Committee was of opinion that this was an ingenious invention, and capable of being very usefully improved, but they apprehended that the construction of it was rather too weak for practice; however, as this Mill was preferable to the other candidate's Wind Mill, and some useful improvements might be made to it, the Committee was of opinion that Mr. Lewis was entitled to the premium of fifty pounds.

This resolution of the Committee was confirmed by the Society, October 7, 1761.

C H A P.

C H A P. XIII.

*A short Account of a Model of a WIND MILL, made by
Mr. JAMES VERRIER, of North Curry, in Somersetshire.*

THE inventor of this Mill has contrived a register, or regulator, by which the vanes are suffered to yield and give way to the impetus of the wind, when it is too forceable; and when it is too languid, it brings the vanes up to the wind till its weight or force is sufficient to give the Mill a proper degree of velocity; by this contrivance, the wind is justly weighed, regulated, and proportioned to the resistance, or number of stones put to work; by this means also a regular uniform motion is obtained, and the Mill less liable to be set on fire, or destroyed by the violence of its motion. The inventor, to shew the utility of his regulator, added to his Mill sixteen vanes more than usual; but he intimated to the Committee that a less number was preferable, and that his intentions in putting so great a number was only to shew the power of his regulator.

The length of the arms of the wind shaft is nineteen inches; the length of the sails are twelve inches and an half; the width at the extreme end is seven inches and seven-eighths; their width at the center end is two inches and seven-eighths. The sails of this Mill are fastened with hinges to their whips, or arms, in such a manner, that the proportion of their leading and driving parts are as one to two.

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The angle of their inclination, when first opposed to the wind, is forty-five degrees, and regularly the same from end to end. At the end nearest to the center of each of the four cardinal sails, are fixed four quadrants, by which they are kept up to the wind, or fall off from it, by means of double chains, or ropes, fixed to the four cross arms, or braces, which are framed by their center to a long iron roller, and pass through a hole bored lengthwise from end to end through the wind shaft. At the innermost end of the said rod, or spindle, is fixed a register, or regulator, with a double chain to the barrel, or roller, round which is a line with a weight which is intended to be greater or less according to the power of the wind, and the number of stones put to work; the whip, or arms, are all bolted to a thick circular rim, and cross pieces within, by which they are much better secured, and much stronger than by the usual method; the head wheels of this Mill are made conical, by which means the teeth fall better in contact with each other, and have a more equal wearing in all parts. The perpendicular shaft is much shorter than usual, by which means the whole building (particularly the floor on which the stones are placed) is considerably stronger, and less liable to vibrate than in the common Mills; the ends of the whips are not entered more than two inches into the trimmer of the shafts, by which they are not so much weakened as on the usual way.

The Committee was of opinion that the inventor of this Mill was well worthy of a bounty of fifty pounds, and accordingly recommended to the Society to give him the same; to which the Society agreed, December 31, 1761.

C H A P.

C H A P. XIV.

*A short Description of the Model of Mr. GALABINE'S
CRANE.*

TH E first moving power of this machine is an endless screw turned with a winch ; this screw is connected to a vertical wheel, on whose axis is a barrel, or roller, to which is fastened a cord with a weight ; and by this simple contrivance only, the men can take up or let down the load with facility, without any danger of the weights returning back to injure the workmen. The Committee were of opinion that this Crane will be useful in mines, and for raising weights, and that Mr. Galabine was deserving of a reward of twenty guineas.

This resolution of the Committee was confirmed by the Society, Jan. 28, 1760.

C H A P. XV.

A short Description of Mr. JAMES FERGUSON's CRANE.

THIS Crane raises small weights as speedily as common Cranes, and greater weights with a proportionable diminution of celerity ; it will also have a power suited to extraordinary great weights, which it will raise without any danger to the persons who work it. In this model the winch is equal to the diameter, or double radius of that part of the great axis on which the rope is wound, and therefore in this case the power of the axis in coiling the rope, is equal to double the power applied by the operator to the winch. There are three trundles which take into the cogs of the great wheel, for giving the axis three different powers ; the second being double the first, and the third double the second, under the moveable pulley below the long arm, or gib, which, being used with either of the trundles, doubles the powers thereof, but it needs only to be used when the Crane is used for an extraordinary great weight. A more particular account of this Crane may be seen in the Philosophical Transactions, Vol. 45, Page 24.

The Committee resolved, that this candidate was worthy of a bounty of Fifty Pounds ; to which the Society agreed, Feb. 25, 1762.

C H A P. XVI.

A short Account of a D O O R L O C K, by Mr. MOORE.

THIS Lock is made in the usual manner with wards and a tumbler, to which the inventor has made some useful improvements, namely, two pin stoppers, on springs, within the Lock. The springs being pressed down by the key (as on an inclined plane) make room for the key to pass the bolt, and when the bolt is passed by, the two stoppers rise and prevent any possibility of opening it, without the key belonging thereto.

The Committee was of opinion that a bounty of Twenty Pounds be given to Mr. Moore; to which the Society agreed, March 2, 1763.

C H A P. XVII.

*A short Account of a Model of a F O U R W H E E L
C A R R I A G E, by Mr. THOMAS COTTON, of Chigwell,
Essex.*

THIS Carriage has a short piece of wood, mortised on each side of the under carriage of the fore wheels; the pieces are made of such a length, as to prevent the felines of the wheels from bearing or rubbing against the perch, when the Carriage turns: by this means the locking of the fore wheels is effectually prevented, and consequently many accidents, which frequently happen by overturning when the fore wheel locks under the perch.

The Committee was of opinion that this ingenious contrivance was deserving a bounty of Twenty Guineas; to which the Society agreed, Nov. 13, 1767.

C H A P.

C H A P. XVIII.

*A short Account of a Model of a FOUR WHEEL
CARRIAGE, by Messrs. CRANFIELD, and Co.*

THIS Carriage is so constructed as to receive First, The greatest part of the load on the hind wheels. Secondly, The application of the shaft will prevent the shaking of the thrill horse, in rugged and irregular roads, and prevent his being thrown down, or hurt, in case the Carriage should be overturned. Thirdly, The turning will be greatly facilitated, by means of the friction wheels, under the bed of the Carriage. Fourthly, As the fore wheels turn under the waggon, in the nature of a crane neck chariot, they can never lock, and consequently will be less liable to overturn the carriages.

The Committee resolved to recommend to the Society a bounty of Thirty Guineas to Messrs. Cranfield and Co. to which the Society agreed, May 20, 1765.

C H A P. XIX.

A short Account of the Encouragement given by the Society to the Turbot Fishery, and the supplying the London and Westminster Markets with Fish by Land Carriage, &c.

IT having been long observed that the Dutch are extremely assiduous and expert, in fishing for Turbot and Cod on the British coast; a worthy Member of the Society formed a plan for establishing their method of fishing, and also for supplying the London markets with Fish by Land Carriage, &c. This plan was laid before the Society, who approved of it, and advanced several thousand pounds towards carrying it into execution: and as a further encouragement to the scheme, the Society offered a great number of premiums to fishermen, and others, to engage in this undertaking.

There were also several premiums offered to wheelwrights; or any other persons, who should produce to the Society the best and lightest carriage with four wheels, and also for the best with two wheels, properly constructed for travelling with speed and ease. In consequence of those premiums, several carriages were produced, and examined by the Committee of Mechanics, who was of opinion that the four-wheel carriage, made by Mr. Stephen Bolt, was deserving the first premium of twenty pounds. That his carriage
with

with two wheels, was intitled to the first premium of Fourteen Pounds, and that Mr. Joachim Smith was intitled to the same premium of Seven Pounds.

This resolution of the Committee was agreed to by the Society, May 12, 1762.

N. B. These carriages and a complete Dutch apparatus for the Turbot Fishery may be seen in the Society's Repository; a description of which is set forth in page 265, and a perspective view of a Dutch Fishing Boat, with fishing lines, snoods, and hooks, properly laid. See Plate, No 47.

C H A P. XX.

A short Account of the Premiums given by the Society for Blocks, or Models of Ships, and of the Machines, with which the Velocity and Stiffness of the Models were ascertained.

IN the year 1758, a very worthy Member of the Society intimated to the Society, that it was probable that some improvements might be made in the art of ship-building; and as nothing could be more worthy of the Society's notice, premiums were immediately offered for the best model of a Seventy-four gun Ship, and for a Twenty gun.

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These models were accurately tried before a very reputable Committee, who had, previous to the trials, ordered Mr. William Bailey to make one machine for trying, within doors, the stiffness and velocity of each model, or block, and two others for trying them out of doors. The former was supplied with a perpetual stream of water by a double pump, with which two men and a boy raised five hogheads, and five gallons, beer measure, per minute. A particular description of these machines may be seen in the Society's minute books relating to this affair.

In consequence of the above premiums, three models of ships were produced in the year 1759, but the candidates not having complied with the terms of the advertisement, neither of them were intitled to the premium offered for this article.

In the year 1759, a premium of Fifty Pounds was offered for the best model of a ship to draw seventeen feet of water, depth of the keel included, and to be six hundred and fifty tons burthen. A premium of Thirty Pounds was likewise offered for the best block of twelve feet draught of water, and three hundred and eighty tons burthen, each block or model to be made to a scale of one quarter of an inch for a foot.

One claim in each of those classes were produced in 1760. To each of which the Society adjudged Fifteen Pounds, part of the premium of Fifty Pounds, and Thirty Pounds to Mr. Alderidge, the only candidate.

In the year 1763, the models of ships for the years 1760, 1761, and 1762, were examined and tried; and the Committee resolved that the model of a Seventy-four gun Ship, made by Mr.
Constable,

Constable, in the year 1760, was deserving the whole premium of One Hundred Pounds. That the model of a Frigate made by Mr. Nehemiah Nesbit, in the same year, was intitled to the whole premium of Sixty Pounds ; and that Mr. William Oxenham (according to the terms of the advertisement for the year 1761) was intitled to the sum of Twenty Pounds for his model of a Frigate.

The models of ships, brought in for the year 1762, being inferior to those of the former years, neither of the candidates were intitled to the premiums offered.

C H A P. XXI.

A short Account of the Pumps, produced to the Society, for extracting Water out of Ships.

IN consequence of the Society's premiums offered for the best Pump, or Machine, for extracting water out of ships, four models of machines for that purpose were produced to the Society ; but, as the claimants had sent models, instead of Pumps, or Engines, in their full magnitude, neither of them could be admitted candidates.

In the year 1765, several machines were produced and tried, on board the *Jane* and the *Surprize* Men of War, at Deptford ; but as they all proved inferior to the Chain Pump, the candidates were not intitled to the premium.

August

August 2, 1766, A trial was made of Mr. Bowden's Pump, against the common chain pump, on board the Egmont, in Greenland Dock. The chain pump, four inch bore, and twenty-three feet eleven inches deep, was worked by six men, who in fifteen minutes, raised forty-three barrels and three gallons of water.

Mr. Bowden's Pump was thirteen inches bore on the barrels, the suction pipe six inches, and twenty-three feet eleven inches deep; six men worked this Pump fifteen minutes, and raised sixty-five barrels and twenty-eight gallons.

Another trial was made on board the Egmont, August 21. Mr. Bowden's Pump was worked, when the ship was heeled nineteen degrees, five minutes; when six men, in nine minutes and five seconds, raised thirty-six barrels and thirty-five gallons of water with the very same Pump, as in the former trial against the chain pump.

The Committee came to a resolution that Mr. Bowden's Pump was preferable to the chain pump, or any other pump, or machine, now known, or in use at sea; and that Mr. Bowden was intitled to the premium of one hundred pounds for the best pump, or machine, for extracting water out of ships.

To which the Society agreed, October 29, 1766.

May 7, 1767. Trial was made of the four following Pumps, or Machines, which were examined and tried on board the ship Peggy, off Gun Dock, Wapping.

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| 1. Mr. Clarke's, ——— | 2. Mr. Braithwait's, |
| 3. Mr. Coleman's, ——— | 4. The Liverpool. |

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The quantity of water raised, and the height, being much inferior to what was performed by Mr. Bowden's, and the chain pump, neither of the candidates were intitled to the premiums offered.

September 19. The Liverpool pump was tried on board the Hulk, at Deptford, against one invented by Monsieur Delaniers, recommended by Mr. Daubitz, but neither of them raised the quantity required by the Society's advertisement.

C H A P. XXII.

A short Account of Mr. JOHN WINN'S APPARATUS for saving the Lives of Sailors, &c. cast away on a Lee Shore.

THE inventor of this Apparatus was a shipwright, who was frequently employed as a pilot, to conduct ships into roads and harbours; and had often distinguished himself for his courage and activity, in saving the lives and effects in ships cast away on a lee shore. This employment excited the ingenious shipwright to think of some method of conveying men and merchandize (circumstanced as above) to the shore, with more safety and expedition than could be done by any means yet discovered:

covered : accordingly, he, by close application and repeated experiments, completed an Apparatus which he had contrived for that purpose ; and after several successful trials of it on ships in distress, he exhibited a model of his Apparatus in the Society's great room, where a Committee was appointed to examine it, and where the inventor was very particular in explaining the manner of its operation, which proved to the satisfaction of the Committee, who was of opinion, that the invention was ingenious, simple, and seemed calculated to answer the end proposed ; they therefore resolved to recommend to the Society, to give Mr. Winn the Silver Medal of the Society, for his ingenious method of saving the lives of sailors, &c. To which the Society agreed, March 11, 1767.

N. B. Some time before Mr. Winn's decease, he tried several experiments in the Strand, and other public streets, to shew the utility of his Apparatus, in escaping from houses on fire.

In one of the experiments, in three minutes the Apparatus was fixed to the window of a second floor ; and a man let himself and two boys down into the street, on the opposite side of the way, where the end of the Apparatus was fastened to a post ; the man immediately worked himself up to the window again, and a woman let herself with two girls down with great ease and safety.

C H A P. XXIII.

A short Account of several Machines produced to the Society, for which the Inventors were rewarded with Bounties adequate to the utility of their Machines.

1. **I**N the year 1762, the ingenious Mr. James Ferguson, produced to the Society a model of his crane, with three powers, which was examined by the Committee of Mechanics, who resolved to recommend to the Society to give the inventor a bounty of Fifty Pounds, on condition he would leave the said model with the Society for the use of the public.

To which the Society agreed, Feb. 25, 1762.

2. In the year 1767, Mr. Aaron Millar, of New Jersey, presented the Society with a very curious compass, and protractor, for which he had the thanks of the Society, and a bounty of Ten Guineas.

3. In the year 1767, an expanding rod for gauging vessels, was produced to the Society by Mr. James Efford, the inventor. This machine was examined by the Committee of Mechanics, who recommended to the Society to give the inventor a bounty of Twenty Pounds; he leaving the machine with the Society.

To which the Society agreed, April 22, 1767.

N. B.

N. B. About two years after, Mr. Efford produced another expanding Rod, with considerable improvements, for which he had also a bounty of Fifteen Guineas.

4. In the year 1768, a Machine Cart was produced to the Society, in its full magnitude, by Mr. George Black, of Berwick upon Tweed. By the machinery fixed to the Cart, one man, without cattle, can drive it on plain ground, when loaded; but the inventor's intention was only to use the machinery occasionally, when the Cart is in a flough, or going up a hill.

The Committee appointed to examine this Cart, resolved that the machinery, added to the Cart, appears to have some ingenuity in its construction, and may be useful.

Resolved to recommend to the Society, to give Mr. Black a bounty of Ten Guineas for his invention; he sending a model of it to the Society, in the proportion of three inches to a foot.

To which the Society agreed, April 22, 1768.

5. In the year 1769, a Model of a Machine for forging Wheel-tire, was produced to the Society by Mr. Thomas Hunt.

The inventor of this Model was of opinion that three strokes with the stamper of his Machine, was sufficient to form one length of Tire, and that three strokes more would punch the holes in the same. This operation is performed (according to the Model) by a falling weight, somewhat similar to the Machine for driving piles.

The Committee appointed to examine the Machine, resolved that Mr. Hunt's method of discharging the falling weight, appears to be

be new, ingenious, and fimple ; and that it was the opinion of the Committee, that a bounty of Ten Guineas be given to Mr. Hunt, he leaving the Model with the Society.

Which was agreed to by the Society, April 26, 1769.

6. In the year 1769, a portable Iron Oven for the use of private families, was produced to the Society, by Mr. Robert Clement, the inventor. This Oven was referred to the consideration of the Committee of Mechanics, who examined it, and made several trials of its utility ; and particularly on January 4, at which time two quartern loaves were prepared by a baker, and baked in the said Oven, at the Society's Office, in presence of the Committee ; who were of opinion that the said loaves were well and sufficiently baked within the space of two hours, and with a very small quantity of sea coal, and that the said Oven was new, and useful for many purposes in private families, and at sea.

Resolved, it is the opinion of the Committee that the said Oven may be heated with any other fuel ; and that it be recommended to the Society to give Mr. Clement a bounty of Fifteen Guineas, he leaving the Oven the property of the Society.

To which resolution the Society agreed, January 15, 1770.

7. In the year 1769, a Bolting Mill was produced to the Society, by Mr. Nathaniel Stedman. This Mill was referred to the Committee of Mechanics, who examined it, and had it worked in their presence, and was of opinion that it was new, ingenious, and useful, and deserving the encouragement of the Society ; and that Mr. Stedman was deserving a bounty of Fifteen Guineas, he leaving
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ing a complete Mill with the Society, for the use of the public ; which was agreed to by the Society, January 20, 1770.

8. In the year 1769, a model of an Hydraulic Engine for raising water by water, was produced to the Society, by the inventor, Mr. William Westgarth. This Engine came extremely well recommended by the ingenious Mr. Smeton, who has seen several of Mr. Westgarth's Engines built at large, and applied to real use ; and is of opinion that this invention is the greatest stroke of art in the Hydraulic way that has appeared since the invention of the steam engine. Mr. Smeton is of opinion also, that this machine is not only adapted to the raising water by water for draining of mines ; but the same principles can readily be extended to the raising of water for supplying towns, gentlemen's gardens, houses, &c. and universally for raising water from any depth, wherever a fall of water can be procured, and particularly so where the fall of water is at least thirty or forty feet.

Mr. Smeton's judicious observations on this useful machine, were referred to the Committee of Mechanics, who examined the model, had it worked in their presence, and resolved, that where a fall of water can be obtained, Mr. Westgarth's Engine will admit of great variety in its use ; and that his method for charging and discharging of the power, is new, ingenious, and effectual for the purpose of raising water in great quantities to small heights, or in small quantities to great heights.

Resolved to recommend to the Society to give Mr. Westgarth a bounty of Fifty Guineas, he leaving his model with the Society for
the

the use of the public; to which the Society agreed, May 24 1769.

9. In the year 1770, a new invented Chaff Cutter, invented by Mr. William Bailey, was examined and worked against a common chaff cutter, in presence of the Committee of Agriculture, who proceeded to a comparative trial between the new Chaff Cutter, and that commonly used; in order to which, a quantity of straw was procured and weighed, and each truss was allowed to be thirty-five pounds and an half. The common machine was worked by an experienced chaff cutter, and the new machine by a common carpenter, unacquainted in the art of cutting chaff; the new machine cut forty-three pounds and an half in thirty minutes, which measured six bushels and two pecks; the common machine cut in thirty minutes twenty-nine pounds, which measured four bushels, one peck, and a quarter. The straw cut with the new machine was sifted, and there remained one peck unfit for use; (but it was apprehended that the man would have made better work, and greater dispatch, if he had known how to have laid the straw properly into the machine) the chaff cut with the common machine appeared to require no sifting; it appeared also that the chaff cut with this machine, was of more equal length than that cut with the new machine, even after sifting. The Committee was of opinion that Mr. Bailey's machine was new, ingenious, and may be particularly beneficial in those counties where chaff cutting is not now practised; and that, with written directions only, any person will be immediately capable of working it.

The

The Committe resolved, that Mr. Bailey was deserving of a bounty of Twenty Guineas, he leaving the Machine with the Society, at an expence not exceeding Six Guineas: this resolution of the Committee was agreed to by the Society, May 31, 1770.

N. B. This Machine may be set, in half a minute's time, to cut the straw to any degree of length, from a quarter of an inch to four inches; that, without loss of time, the straw is brought forward by every stroke of the knife, to the degree the Machine is set to: and that any person, by a very little practice, may work it with much greater safety and dispatch, than can be done the common way.

END OF BOOK VIII.



B O O K IX.

Honorary and Pecuniary Premiums given for divers Articles in CHEMISTRY.

Honorary Premiums.

1763. **T**O the Rev. Mr. Jared Eliott, for producing malleable iron from American black sand, a gold medal.

1766. To Mr. Samuel Bowen, of Georgia, for his useful observations in China, and industrious application of them in Georgia, a gold medal.

To Robert Dossie, Esq; for effectually aiding to establish the manufacture of potash, in North America, a gold medal.

To Dr. William Lewis, M. B. F. R. S. for his method of assaying potash, a gold medal.

1767. To Mr. Phillippo (an Asiatic) for introducing the Eastern dyes of leather, a gold medal.

1769. To Mr. James English, for cultivating rhubarb in England, a gold medal.

1770.

1770. To Dr. James Mountfey, for introducing the true rhubarb feed, a gold medal.

To Ifaac Jemineau, Esq. for his zeal to promote the views of the Society, a gold medal.

Pecuniary Premiums.

1755. To Mr. Beauchamp, of Truro, in Cornwall, a premium, for cobalt from a British mine, thirty pounds.

1758. To Mr. Jacob Hagan, jun. a premium for making one hundred weight of verdigrise, twenty pounds.

1759. To Mr. Herbert Chambers, a premium, for improvements in staining marble, ten pounds.

To Jean Sifferth, a premium, for making crucibles in England, thirty pounds.

To Henry Richards, a premium, for making earthen retorts, twenty pounds.

1761. To Mr. William White, a premium, for making crucibles, thirty pounds.

To Robert Doffie, Esq; a premium, for discovering the processes foredulcorating train oil, one hundred pounds.

To Mr. — Perreneau, a premium, for myrtle wax, thirty pounds.

To Mr. John Wilson, a premium, for dyeing cotton yarn Turkey red, fifty pounds.

To

To Mr. Anthony Bacon, a premium, for myrtle wax, twenty pounds.

1762. To Mr. Jacob Luberic, a bounty, for making of crucibles in England, twenty-one pounds.

To Mr. David Creagh, a bounty, for improvements in Papin's digester, thirty-one pounds, ten shillings.

1763. To John Bindley, Esq; a premium, for making verdigrise, fifty pounds.

To Mr. John Monk, a premium, for making varnish to prevent steel or iron from rusting whilst manufacturing, twenty pounds.

To Mr. Stephen Bedford, part of a premium, for making varnish, fifteen pounds.

1764. To Mr. Nicholas Crisp, of Bow Church Yard, London, for making zaffre and smalt from English cobalt, fifty pounds

To Mr. Edward Carter, a bounty, for a substitute for borax, thirty-one pounds, ten shillings.

To John Brindley, Esq; a premium, for verdigrise, one hundred pounds.

To Mrs. Parry, for extracting oil from sessamum seed, one pound one shilling.

To Mr. Jeremiah Brown, of Virginia, a bounty, for making salt-petre in America, fifty pounds.

To Mr. Simon Spurrett, of Isleworth, Middlesex, for the invention of dyeing cotton yarn Turkey red, one hundred pounds.

1766. To Mr. Humphrey Jackson, a premium, for dyeing cotton or linen yarn green, twenty pounds.

To

To Mr. Jacob Luberick, for making crucibles in England, fifty pounds.

1767. To Mr. John Griffell, a premium, for dyeing linen yarn yellow, forty pounds.

To Mr. John Griffell, a premium, for dyeing linen yarn green, twenty pounds.

To Mr. Phillippo (as before-mentioned) a bounty, for revealing the manner of dyeing leather red and yellow, as used in Turkey, one hundred pounds.

1769. To Mr. Samuel Falconbridge, a bounty, for sal ammoniac, twenty-one pounds.

1770. To Mr. Abraham Pelling, a bounty, for glafs for achromatic telescopes, thirty pounds.

END OF BOOK IX.

B O O K X.

A short Account of the Honorary and Pecuniary Premiums and Bounties, given by the Society, for planting Mulberry Trees, Vines, and divers other Articles, in the British Colonies in America.

Honorary Premiums for planting Vines, &c.

1762. **T**O Mr. Carter, of Virginia, for planting vines, a gold medal.

To Edward Anthill, Esq; for planting vines to the North of the river Delaware, a gold medal.

1770. To Edward Anthill, Esq; for Ditto, a gold medal.

Pecuniary Premiums, &c.

1755. Paid into the hands of Benjamin Martin, Esq; to be remitted to Messrs. Habersham and Otterlenge, in Georgia, to be by them distributed to the several claimants for white mulberry trees, raised in the province of Georgia, pursuant to the Society's advertisement, which account is as follows :

To Henry Young, Esq; for planting the greatest number of mulberry trees, the first premium, ten pounds.

To Sir Patrick Houston, Bart. second premium, five pounds.

To

To Mr. Benedict Burquin, and to Mr. Theobald Kuffer, the second premium of five pounds divided between them.

1759. Paid Messrs. Habersham and Otterlenge's draft, for money paid by them for producing cocoons in Georgia, eighty-seven pounds fifteen shillings and eleven-pence.

1760. Paid premiums for silk in Georgia, one hundred and thirty-six pounds two shillings and nine-pence three-farthings.

1761. Paid Mr. Otterlenge's draft, for premiums for cocoons, one hundred pounds thirteen shillings and nine-pence.

Dec. 17. Paid draft for premiums for cocoons in Georgia, sixty-five pounds fourteen shillings and eight-pence.

1763. Paid Mr. Murdock Middleton, for cuttings of vines, five pounds five shillings.

March 26. Paid draft for premiums for cocoons in Georgia, one hundred and eighty-eight pounds fifteen shillings and four-pence.

Nov. 30. Paid premiums for cocoons in Georgia, one hundred and ninety pounds one shilling and four-pence.

Dec. 31. Paid Mr. Otterlenge's draft for premiums for cocoons, one hundred and ninety-three pounds seven shillings and ten-pence.

Jan. 1765. Paid Edward Boehm, Esq; first premium for sturgeon, fifty pounds.

31. Paid Mr. Bouryan, second premium for ditto, twenty-five pounds.

April 5.

April 5. Paid Jared Engerfall, Esq; for silk in Connecticut, eighty-nine pounds.

June 7. Paid Messrs. Hughes and Whitlock, premium, for twenty-five tons of potash, one hundred pounds.

Paid Messrs. Barnard and Harrison, for twenty tons, eighty pounds.

11 Paid Messrs. Lane and Booth, for fifty-four tons, two hundred and sixteen pounds.

July 26. Paid Mr. John Cowley, for one ton, four pounds.

Nov. 22. Paid Messrs. Lane and Booth, for twenty-two tons and six hundred weight, eighty-nine pounds four shillings.

Jan. 16, 1766. Paid a draft for premiums, for cocoons in Georgia, one hundred and fifty-five pounds thirteen shillings and eleven-pence.

March 15. Paid Mr. Humphrey Jackson, for importing surgeon, fifty pounds.

May 23. Paid Messrs. Menzies and Co. for potash, seven pounds fifteen shillings.

Paid Messrs. Lane and Booth, for potash, one hundred and thirty-three pounds, fifteen shillings and six-pence.

Paid Mr. Abraham Dupries, twenty pounds fourteen shillings.

24. Paid Messrs. Hughes and Whitlock, two hundred and twenty-four pounds five shillings.

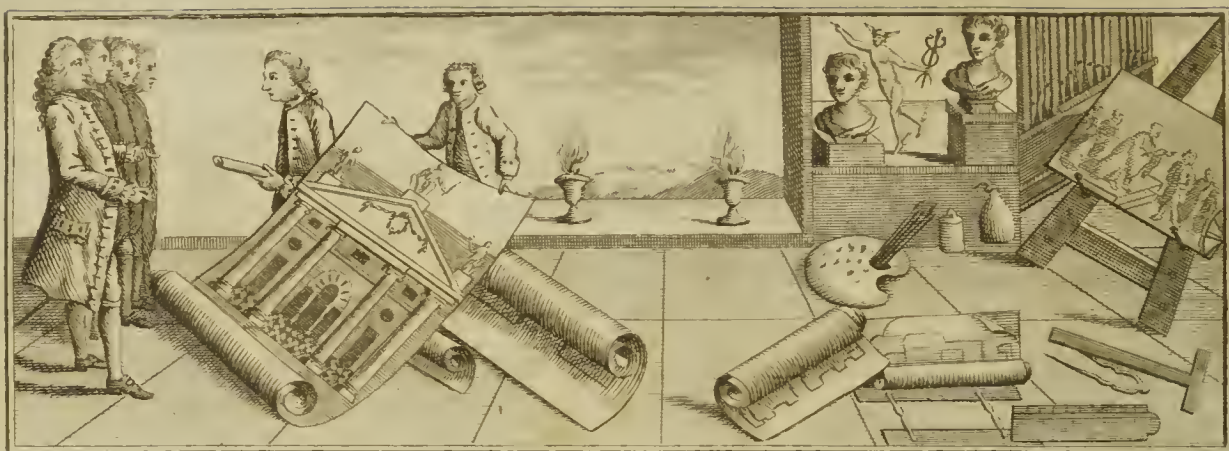
March 21,

March 21, 1767. Paid Messrs. Otterlenges, a draft for cocoons in Georgia, two hundred and fifty-four pounds, twelve shillings and six-pence.

June 13. Paid Sir William Baker, a premium, for pearl ash, six pounds two shillings.

May 18, 1767. To Edward Anthill, Esq; for planting eight hundred vines to the north of the Delaware river, two hundred pounds.

E N D O F B O O K X.



B O O K XI.

A short Account of the Pecuniary Premiums, and Bounties, given in the Polite Arts.

AT the first institution of the Society, the Polite Arts was the principal object of their attention ; but there was no regular account kept of the candidates names, or the rewards given to them till January 10, 1755, when the following premiums were given, viz.

To Mr. James Schooler, for drawing the head of one of the candidates from the life, - - - 4 0 0

And to the under-written Candidates for Drawings from Mr. Shipley's Collection of Prints, Pictures, Drawings, Models, &c.

To Miss Elizabeth Keith, for drawing a head, - 4 0 0

To Mr. Elias Durnford, for ditto, - - 3 0 0

To Mr. Richard Dubore, for ditto, - - 2 0 0

To Mr. Richard Revel, for ditto - - 1 0 0

Total 14 0 0

To Candidates under 14 Years of Age.

Mr. Richard Cofway,	-	-	-	5 0 0
Mr. John Smart,	-	-	-	4 0 0
Mr. John Gresse,	-	-	-	3 0 0
Miss Barbara Marsden	-	-	-	2 0 0
Mr. John Ashwood Porter,	-	-	-	1 0 0
Total				15 0 0

Drawings by Boys and Girls under 14 Years of Age.

1756. Mr. John Smart,	-	-	-	5 0 0
Mr. William Pars,	-	-	-	4 0 0
Mr. Lewis Pingo,	-	-	-	3 0 0
Mr. Simon Taylor,	-	-	-	2 0 0
Miss Barbara Marsden,	-	-	-	1 0 0
Total				15 0 0

Drawings by Candidates under 17 Years of Age.

Mr. John Hall,	-	-	-	5 0 0
Mr. John Gresse,	-	-	-	4 0 0
Mr. William Pether,	-	-	-	3 0 0
Miss Elizabeth Brown,	-	-	-	2 0 0
Mr. James Wood,	-	-	-	1 0 0
Total				15 0 0

For the best fancied Designs by Candidates under 17 Years of Age.

Mr. Elias Durnford,	-	-	-	5 0 0
Mr. Henry Pingo,	-	-	-	4 0 0
Mr. Thomas Davis,	-	-	-	3 0 0
Mr. William Pars,	-	-	-	2 0 0
Mr. William Pether,	-	-	-	1 0 0
Total				15 0 0

For the best fancied Designs by Candidates under 14 Years of Age.

1757. Mr. William Pars,	-	-	5	0	0
Mr. William Parsons,	-	-	4	0	0
Mr. Richard Earlom,			3	0	0
Mr. Johnfon Carr,	-	-	2	2	0
Mr. William Looker	-	-	1	0	0
Total			15	0	0

Drawings by Candidates under 17 Years of Age.

Mr. John Smart,	-	-	5	0	0
Mr. Simon Taylor,	-	-	4	0	0
Mr. James Gandon,	-	-	3	0	0
Mr. William Lifford,	-	-	2	0	0
Mr. John Edwards,	-	-	1	0	0
Total			15	0	0

For the best fancied Designs by Youths under 17 Years of Age.

Mr. Isaac Martel,	-	-	5	0	0
Mr. Richard Cofway,	-	-	4	0	0
Mr. John Gresse,	-	-	3	0	0
Mr. Lewis Pingo,	-	-	2	0	0
Mr. Andrew Dumford,	-	-	1	0	0
Total			15	0	0

For the best fancied Designs by Girls under 17 Years of Age.

Miss Barbara Marsden,	-	-	5	0	0
Miss Sarah Kirby,			4	0	0
Miss Hannah Chambers,			3	0	0
Miss Mary Chambers,	-	-	2	0	0
Miss Eleanor Clark,	-	-	1	0	0
Total			15	0	0

For the best Drawing of an human Figure from Plaister, by Youths under 18 Years of Age.

1758. Mr. John Smart,	-	-	5	0	0
Mr. Richard Cofway,	-	-	4	0	0
Mr. John Grefle,	-	-	3	0	0
Mr. William Pars,	-	-	2	0	0
Total			14	0	0

Drawings or Compositions of Ornaments, by Youths under 15 Years of Age.

Mr. Andrew Durnford,	-	-	5	0	0
Mr. Lewis Pingo,	-	-	4	0	0
Mr. William Willis,	-	-	3	0	0
Mr. John Bellingham,	-	-	2	0	0
Mr. Joseph Bellingham,	-	-	1	0	0
Total			15	0	0

Drawings, after Prints, by Youths under 16 Years of Age.

Mr. Richard Earlom,	-	-	5	0	0
Mr. William Parsons,	-	-	4	0	0
Mr. Johnson Carr,	-	-	3	0	0
Mr. Simon Taylor,	-	-	2	0	0
Mr. Richard Cross,	-	-	1	0	0
Total			15	0	0

Drawings

Drawings or Compositions of Ornaments, by Youths under 18 Years of Age.

Mr. Henry Pingo,	-	-	-	5	0	0
Mr. William Chinnery,	-		-	4	0	0
Mr. Frederick Millar,	-	-		3	0	0
Mr. Mt. James Gandon,	-	-	-	2	0	0
Mr. Matthias Stable,	-	-	-	1	0	0
Total				15	0	0

For the best Drawings or Compositions of Ornaments, by Girls under 18 Years of Age.

Miss Hannah Chambers,	-	-	-	5	0	0
Miss Mary Pingo,	-	-	-	4	0	0
Miss Sarah Kirby,	-	-	-	3	0	0
Miss Sarah Clerkson,	-	-	-	2	0	0
Miss Ann Henshaw,	-	-	-	1	0	0
Total				15	0	0

For the best Drawings or Compositions of Ornaments, by Girls under 15 Years of Age.

Miss Mary Moser,	-	-	-	5	0	0
Miss Barbara Marsden,	-	-	-	4	0	0
Miss Mary Chambers,	-	-	-	3	0	0
Miss Eleanor Clark,	-	-	-	2	0	0
Miss Ann Schooler,	-	-	-	1	0	0
Total				15	0	0

For the best Drawings in the Class under 14 Years of Age, who have not been taught or instructed.

Mr. John Ruffell,	-	-	-	5	0	0
Mr. George Smithson,	-	-	-	4	0	0
Mr. William Williams,	-	-	-	3	0	0
Mr. E. Waters,	-	-	-	2	0	0
Mr. Benjamin Valliamy,	-	-	-	1	0	0
Total				15	0	0

The above Premiums confirmed January 11, 1758.

Model of Face, and reverse, in wax, by Mr. Joachim Smith,					
under 22 years of age,	-	-	10	10	0
Mr. Nathaniel Smith, for a model in clay,		-	15	15	0
			<hr/>		
		Total	26	5	0

Class 58. *Drawing of an human Figure under 22 Years of Age.*

1759. Mr. Nathaniel Smith,	-	-	5	5	0
Mr. William Pethers,	-	-	4	4	0
Mr. Joseph Nollekens,	-	-	3	3	0
Mr. Richard Cofway,	-	-	2	2	0
Mr. Michael Steel,	-	-	1	1	0
			<hr/>		
Total			15	15	0

Class 60. *For the best Drawing after Nature, under 17 Years of Age.*

Mr. Nathaniel Smith, the only candidate in this class,	3	3	0
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Class

Class 61. *Drawings after Nature, under 17 Years of Age.*

Mr. William Pars,	-	-	5	5	0
Mr. Simon Taylor,	-	-	4	4	0
Mr. Bellingham,	-	-	3	3	0
Mr. Matthias Stable,	-	-	2	2	0
			<hr/>		
			14	14	0

N. B. Four candidates only in this class.

Class 62. *For the best Drawings or Compositions after Nature, under 20 Years of Age.*

Miss Rachael Chambers, the only candidate in this class, 5 0 0

Class 63. *For the best Drawings of Ornaments, under 18 Years of Age.*

Miss Mary Moser, - - - 5 5 0

To whom the Society gave also a silver medal for extraordinary merit.

Miss Mary Chambers	-	-	4	4	0
Miss Hannah Chambers,	-	-	3	3	0
Miss Mary Pingo,	-	-	2	2	0
Miss Hannah Rush,	-	-	1	1	0
			<hr/>		
Total			15	15	0

Class 64. *For the same under 18 Years of Age.*

Mr. Lewis Pingo,	-	-	4	4	0
Mr. John Edwards	-	-	3	3	0
Mr. William Sharp,	-	-	2	2	0
			<hr/>		
Total			9	9	0

Class 65. *For the best Drawings of an human Figure, under 18 Years of Age.*

Mr. John Grefse,	-	-	-	5	5	0
Mr. William Pars,	-	-	-	4	4	0
Mr. Simon Taylor,	-	-	-	3	3	0
Mr. Johnson Carr,	-	-	-	2	2	0
Mr. Lewis Pingo,	-	-	-	1	1	0
Total				15	15	0

Class 66. *For the best Drawings of any Kind, under 18 Years of Age.*

Mr. Michael Rooker,	-	-	-	5	5	0
Mr. John Ruffell,	-	-	-	4	4	0
Mr. George Herbert,	-	-	-	3	3	0
Mr. Hugh Barron,	-	-	-	2	2	0
Mr. William Willis,	-	-	-	1	1	0
Total				15	15	0

Class 67. *For the best Drawings for Cabinet Makers, under 22 Years of Age.*

Mr. Francis Town,	-	-	-	6	6	0
Mr. Henry Pingo,	-	-	-	5	5	0
Mr. William Alderson,	-	-	-	4	4	0
Mr. Joachim Smith,	-	-	-	3	3	0
Mr. William Chinnery,	-	-	-	2	2	0
Total				21	0	0

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Class

Class 56. *Premiums confirmed the 28th of March, 1759, for Drawings at the Academy in St. Martin's Lane, under 20 Years of Age.*

Mr. David Martin,	-	-	-	10	10	0
Mr. John Mortimer,	-	-	-	8	8	0
Mr. William Sherlock,	-	-	-	7	7	0
Mr. William Woolet,	-	-	-	5	5	0
Total				31	10	0

Class 57. *Drawings from the Duke of Richmond's Collection, under 21 Years of Age.*

Mr. John Mortimer,	-	-	-	9	9	0
Mr. John Gresse,	-	-	-	7	7	0
Mr. William Pether.	-	-	-	5	5	0
Mr. Richard Earlom,	-	-	-	4	4	0
Total				26	5	0

Class 59. *For Landscapes, under 19 Years of Age.*

Mr. John Gresse,	-	-	-	8	8	0
Mr. John Hakewell,	-	-	-	6	6	0
Mr. James Gamden,	-	-	-	4	4	0
Mr. William Pars,	-	-	-	2	2	0
Total				21	0	0

Class 72. *For the best Model in Clay, under 22 Years of Age.*

April 25, 1752. Mr. Joseph Nollekens	-	-	-	15	15	0
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Class 73. *For the best Model in Clay, under 19 Years of Age.*

Mr. John Bacon,	-	-	10	10	0
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Class 74. *For the best Model or Composition of Ornaments, under 22 Years of Age.*

Mr. William Sheffield,	—	—	10	10	0
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Class 75. *For the best Model or Composition of Ornaments, under 19 Years of Age.*

Mr. William Hodges,	—	—	2	2	0
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Class 76. Mr. William Pars,	—	—	3	3	0
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Mr. Albertus Pars,	-	-	2	2	0
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			<u>5</u>	<u>5</u>	<u>0</u>
Total			5	5	0

Class 177. *For the best Medallion.*

Mr. Lewis Pingo,	-	-	10	10	0
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May 23. Paid Mr. John Pingo a Premium for a Copper Medal,

-	21	0	0
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Feb. 13, 1760. Paid Mr. John Pingo, for cutting a new reverse to ditto,

-	-	10	10	0
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Mr. Thomas Smith, for an Intaglio,	-	-	10	10	0
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Feb. 27. Mr. Lewis Pingo, for a Medallion,	-	10	10	0
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Mr. John Pingo, for a Copper Medal,	-	21	0	0
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			<u>52</u>	<u>10</u>	<u>0</u>
Total			52	10	0

Class 170. *For a Model in Clay, under 25 Years of Age.*

March 19. Mr. Joseph Nollekens,	-	-	31	10	0
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Class 71. *For a Model in Clay, under 25 Years of Age.*

Mr. John Bacon,	-	-	15	15	0
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Class 72. *A Gratuity for Modelling.*

Mr. Joseph Nollekens,	-	-	10	10	0
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Class 73. *For Modelling, under 22 Years of Age.*

Mr. Nathaniel Smith, first premium,	-	-	9	9	0
Mr. George Parbury, second premium,	-	-	4	4	0
Mr. John Daintree, third premium,	-	-	2	2	0
Total			15	15	0

Class 74. *Under 19 Years of Age.*

Mr. John Scott, first premium,	-	-	6	6	0
Mr. Philip Regnart, second premium,	-	-	4	4	0
Total			10	10	0

For Historical Pièces.

April 9. Mr. Robert Edge Pine, first premium for an historical piece,	-	-	105	0	0
Mr. Andrew Chevalez Cassali, second premium for an historical piece,	-	-	52	10	0
Total			157	10	0

Class 82. *For Landscapes.*

Mr. George Smith, first premium,	-	-	50	0	0
Mr. John Smith, second premium,	-	-	25	0	0
Total			75	0	0

Class 50. *Drawings at the Academy in St. Martin's Lane, under 24 Years of Age.*

Mr. Richard Cofway, first premium,	-	-	10	10	0
Mr. John Mortimer, second premium,	-	-	8	8	0
Mr. David Martin, third premium,	-	-	7	7	0
Mr. Christopher Norton,	-	-	5	5	0
Total			31	10	0

Class 51. *From the Duke of Richmond's Gallery, under 21 Years of Age.*

Mr. John Trotter, first premium,	-	-	6	6	0
Mr. Charles Cartwright, second premium,	-	-	4	4	0
Total			10	10	0

Class 52. *For the best Drawings of an human Figure, from Casts, or Basso Relievo, with Chalk only, under 20 Years of Age.*

Mr. William Lawrenson, first premium,	-	-	6	6	0
Mr. Richard Earlom, second premium,	-	-	4	4	0
Mr. Henry Leake, third premium,	-	-	3	3	0
Mr. William Parry, fourth premium,	-	-	2	2	0
Total			15	15	0

Class 53. *For the best Drawings of an human Figure, after a Print, under 16 Years of Age.*

Mr. William Parsons, first premium,	-	-	5	5	0
Mr. John Ruffell, second premium,	-	-	3	3	0
Mr. Samuel Ireland, third premium,	-		2	2	0
Total			10	10	0

Class 54. *Landscapes after Nature, under 19 Years of Age.*

Mr. John Hakewell, first premium,	-	-	8	8	0
Mr. Johnson Carr, second premium,		-	6	6	0
Mr. John Edwards, third premium,	-	-	4	4	0
Mr. Michael Rooker, fourth premium,	-	-	2	2	0
To Mr. Thomas Vivarez, a gratuity,	-	-	2	2	0
Total			23	2	0

Class 55. *For the best Compositions, after Nature, of Birds, Beasts, &c. under 20 Years of Age.*

Mr. Simon Taylor, first premium,	-	-	6	6	0
Mr. William Willis, second premium,	-	-	2	2	0
Total			8	8	0

Class 57. *For the best Drawings or Compositions, under 20 Years of Age.*

Miss Mary Vivarez, the only candidate,	-		5	5	0
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Class

Class 58. *For the best Drawings or Compositions, under 15 Years of Age.*

Miss Hannah Chambers, first premium,	-	-	4	4	0
Miss Mary Chambers, second premium,	-	-	3	3	0
Total			7	7	0

Class 59. *For the best Drawings or Compositions for Weavers, under 22 Years of Age.*

Mr. Henry Pingo, first premium,	-	-	5	5	0
Mr. William Herbert, second premium,	-	-	5	5	0
Mr. John Bellingham, third premium,	-	-	3	3	0
Mr. William Chinnery, fourth premium,	-	-	2	2	0
Total			15	15	0

Class 61. *For Drawings of an human Figure or Head, after Drawings or Prints, under 14 Years of Age.*

Mr. John Pye, first premium,	-	-	4	4	0
Mr. James Answorth, second premium,	-	-	3	13	6
Mr. Charles Whitton, third premium,	-	-	3	3	0
Mr. William Gastrell, fourth premium,	-	-	2	2	0
Mr. Christopher Finch, fifth premium,	-	-	1	11	6
Mr. Thomas Callard, sixth premium,	-	-	1	1	0
Total.			15	15	0

Class

Class 62. *For the best Drawings of any Kind, human Figures or Heads excepted, under 14 Years of Age.*

Mr. George Hebert, first premium,	-	-	-	4	4	0
Mr. Francis Adams, second premium,	-		-	2	2	0
Mr. George Robinson, third premium,	-		-	1	1	0
A further gratuity to Mr. George Robinson's piece, for extraordinary merit,	-	-	-	4	4	0
Total				11	11	0

Class 63. *For Drawing of an Horse from the Life, under 20 Years of Age.*

April 17, 1760. Mr. William Parr, the only candidate in this class,	-	-	-	10	10	0
Mr. Isaac Nerbal, a bounty, for enamel,	-			10	10	0

Landscapes, under 16 Years of Age.

July 21, 1761. Mr. William Kirby,	-			8	8	0
Mr. Johnson Carr,	-		-	5	5	0
Mr. John Hakewell,	-		-	4	4	0
Mr. Arthur Nelson,	-		-	3	3	0
Total				21	0	0

Mezzotintos, under 21 Years of Age.

Mr. William Pether,	-		-	6	6	0
Mr. Jonathan Spilbury,	-		-	4	4	0
Total				10	10	0

Etchings

Etchings, under 24 Years of Age.

Mr. Thomas Vivarez,	-	3	3	0
Paid Mr. D. Ramier, for his invention of tablets for instructing of children to write, a gratuity,	- -	5	5	0

Class 71. For Engraving History, under 24 Years of Age.

March 11. Paid Mr. Simon Ravenets, a premium,	-	42	0	0
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Class 72. For Engraving an human Figure.

Paid Mr. John Hall, a premium,	- - -	21	0	0
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Class 46. Drawings of an human Figure, at the Academy in St. Martin's Lane, under 24 Years of Age.

April 15, 1761. Mr. John Mortimer, first premium,	14	14	0
Mr. John Taylor, second premium,	-	10	10 0
Mr. David Martin, third premium,	-	6	6 0

Total 31 10 0

Class 47. Drawings from Statues in the Duke of Richmond's Gallery, under 24 Years of Age..

Mr. John Gresse,	-	12	12 0
Mr. Richard Earlom,	-	8	8 0

Total 21 0 0

Class 48. Drawings from Models, &c. under 24 Years of Age.

Mr. William Parry,	-	8	8 0
Mr. William Lawrenson,	-	5	5 0
Mr. John Bellingham,	-	2	2 0

Total 15 15 0

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Class

Class 49. *Drawings of human Figures, by Youths under 16 Years of Age.*

April 15, 1761. Mr. Thomas Vivarez,	-	-	5	5	0
Mr. Hugh Barron,	-	-	3	3	0
Mr. William Willis	-	-	2	2	0
Mr. Charles Whitton,	-	-	1	1	0
Total			11	11	

Class 51. *Drawings or Compositions of Beasts and Birds, under 16 Years of Age.*

Mr. William Pars,	-	-	6	6	0
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Class 52. *For Drawing Flowers, &c. under 16 Years of Age.*

Mr. Simon Taylor,	-	-	6	6	0
Mr. John Edwards,	-	-	4	4	0
Total			10	10	0

Class 53. *Drawings of Beasts, Birds, and Dead Game, under 16 Years of Age.*

Miss Ann Jones,	-	-	5	5	0
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Class 54. *Drawings of Flowers, under 16 Years of Age.*

April 15, 1761. Miss Mary Vivarez,	-	-	5	5	0
Miss Mary Pingo,	-	-	4	4	0
Miss Mary Robinson,	-	-	1	1	0
Total			10	10	0

Class 56. *Drawings or Compositions of Ornaments, by Youths*
under 20 Years of Age.

Mr. Henry Pingo	-	-	-	6	6	0
Mr. Matthias Stable,	-	-	-	4	4	0
Mr. William Sharp,	-	-	-	3	3	0
Mr. Robert Chaffereau,	-	-	-	2	2	0
Total				15	15	0

Class 58. Mr. Christopher Finch,	-	-	-	6	6	0
Mr. Robert Dunkarton,	-	-	-	4	4	0
Mr. Charles Whitton	-	-	-	3	3	0
Mr. William Gastrell,	-	-	-	2	12	6
Mr. William Burges,	-	-	-	2	2	0
Mr. James Answorth,	-	-	-	1	11	6
Mr. Thomas Turner,	-	-	-	1	1	0
Total				21	0	0

Class 59. Mr. George Robertson,	-	-	-	5	5	0
Mr. Joseph Colyer,	-	-	-	3	3	0
Mr. Thomas Grignion,	-	-	-	2	12	6
Mr. Johnson Carr,	-	-	-	2	2	0
Mr. Thomas Cook,	-	-	-	1	11	6
Mr. Thomas Adams,	-	-	-	1	1	0
Total				15	15	0

Class 61. Mr. John Kirk,	-	-	-	17	17	0
Mr. John Pingo,	-	-	-	15	15	0
Total				33	12	0

Clafs 62. Mr. Lewis Pingo, for a copper medal, 21 0 0

Clafs 64. *Baffo Relievs.*

May 6. Mr. John Atkins,	-	31	10	0
Mr. Joseph Nollekens, as a bounty	-	10	10	0
Total		42	0	0

Clafs 65. *Models in Clay.*

May 6, 1761. Mr. Nathaniel Smith,	-	15	15	0
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Clafs 66. Mr. John Bacon,	-	15	15	0
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Clafs 67. Mr. John Walsh,	-	5	5	0
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Clafs 68. Mr. John Daintree,	-	9	9	0
Mr. George Parbury,	-	6	6	0
Total		15	15	0

Clafs 69. Mr. Philip Regnart,	-	3	3	0
Mr. John Scott,	-	7	7	0
Total		10	10	0

Clafs 80. *For History Painting.*

Chevalier Andrew Cafali,	-	105	0	0
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Clafs 82. *For Landscape Paintings.*

Mr. George Smith,	-	52	10	0
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Clafs 83. Mr. John Smith,	-	26	5	0
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Clafs 84. *For Drawings in Architecture.*

Mr. Thomas Wiggins, junior,	-	-	21	0	0
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Clafs 49. *For Drawings of human Figures or Heads, &c.*

Mr. Edward Robinfon,	-	-	4	4	0
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Mr. William Willis,	-	-	2	2	0
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Total	6	6	0
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July 15. To Mr. Jeremiah Meyer, for the best drawing
in Profile,

-	-	21	0	0
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January 20, 1762. *Paid the following Premiums for Drawing
Landscapes, Etchings, Mezzotintos, and Gems.*

Clafs 65. *Landscapes.*

Mr. Johnfon Carr, first premium,	-	-	12	12	0
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Mr. William Hodges, second premium,	-	-	7	7	0
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Mr. Arthur Nelson, third premium,	-	-	5	5	0
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Mr. John Hakewell, fourth premium,	-	-	4	4	0
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Total	29	8	0
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Etchings.

Mr. Henry Bryer, first premium,	-	-	10	10	0
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Mr. Thomas Vivarez, second premium,	-	-	5	5	0
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Total	15	15	0
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Mezzotintos.

Mr. Jonathan Spilsbury, first premium,	-	-	15	15	0
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Mr. William Pether, second premium,	-	-	10	10	0
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Total	26	5	0
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Gems.

Mr. Nathaniel Merchant, the whole premium,	—	10	10	0
March 3. Paid Mr. Ravenett, a premium, for engraving history,	-	42	0	0

Class 101. *Landscapes.*

Mr. John Smith,	-	52	10	0
Mr. William Tomkins,	-	26	5	0
Total		78	15	0

Class 107. *Basso Relievos in Marble.*

Mr. Joseph Nollekens,	-	52	10	0
Mr. Daniel Eggert,	-	26	5	0
Total		78	15	0

Class 50. *Drawings at the Academy in St. Martin's Lane.*

June 3, 1762. Mr. John Taylor,	-	8	8	0
Mr. John Mortimer,	-	7	7	0
Mr. Edward Edwards,	-	6	6	0
Mr. William Pars,	-	5	5	0
Total		27	6	0

Class 51. *Drawings from the Duke of Richmond's Gallery.*

Mr. Richard Earlom,	-	12	12	0
Mr. John Gresse,	-	8	8	0
Mr. William Lawranfon,	-	5	5	0
Total		26	5	0

Class 52. *Drawings of human Figures.*

Mr. William Parry,	-	-	7	7	0
Mr. John Parker,	-	-	4	4	0
Mr. William Chinnery,	-	-	3	3	0
Total			14	14	0

Class 53. *Drawings of human Figures, by Youths under 16 Years of Age.*

Mr. Francis Wheatley,	-	-	5	5	0
Mr. John Kitchenman,	-	-	4	4	0
Mr. Thomas Callard,	-	-	3	3	0
Mr. James Durno	-	-	2	2	0
Mr. John Henderson,	-	-	1	1	0
Total			15	15	0

Class 55. *Fruit and Flowers.*

Mr. John Edwards,	-	-	5	5	0
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Class 56. *Birds, Beasts, &c. by Girls under 16 Years of Age.*

Miss Ann Jones, the whole premium,	-	-	10	10	
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Class 57. *Fruit, Flowers, and Plants, under 16 Years of Age.*

Miss Mary Pingo,	-	-	6	6	0
Miss Mary Ann Hamilton,	-	-	4	4	0
Total			10	10	0

Class 58. *Birds, Beasts, and Flowers, under 20 Years of Age.*

Miss Mary Fearon,	—	—	3	3	0
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Class 59. *Ornaments for Weavers, under 20 Years of Age.*

Mr. William Woodward,	-	-	6	6	0
Mr. Matthias Stable,	-	-	4	4	0
Mr. Boyle Arthur,	-	-	3	3	0
Mr. John Taylor,	-	-	2	2	0
			<hr/>		
Total			15	15	0

Class 60. *Ornaments for Weavers, by Youths under 16 Years of Age.*

Mr. Joseph Bellingham,	-	-	9	9	0
Mr. Joseph Bumfries,	-	-	6	6	0
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Total			15	15	0

Class 63. *Drawings of any Kind.*

Miss Alice Morrison,	-	-	5	5	0
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Class 64. *Drawings of an Horse.*

Mr. Christopher Finch,	-	-	5	5	0
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Class 66. *Drawings in Architecture.*

Mr. Edward Stevens,	-	-	18	18	0
Mr. James Gandon,	-	-	12	12	0
			<hr/>		
Total			31	10	0

Class

Clafs 68. Copper Medals.

Mr. John Kirk,	-	-	31	10	0
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Clafs 69. Mr. John Pingo,	-	-	21	0	0
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Clafs 70. Mr. Lewis Pingo,	-	-	21	0	0
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Clafs 72. Basso Relievos in Portland Stone.

Mr. John Ecksteine,	-	-	15	15	0
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Clafs 74. Basso Relievos in Clay.

Mr. Nathaniel Smith, the whole premium,	-	-	21	0	0
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Mr. William Mitchel,	-	-	10	10	0
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Total			31	10	0
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Clafs 78. Compositions in Clay.

Mr. John Scott,	-	-	8	8	0
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Mr. George George,	-	-	4	4	0
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Mr. John Barnard,	-	-	3	3	0
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Total			15	15	0
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Clafs 79. Models of Ornaments in Clay.

Mr. John Cuenot,	-	-	7	7	0
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Mr. John Carter,	-	-	2	2	0
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Mr. Thomas Earley,	-	-	1	1	0
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Total			10	10	0
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A a a

Clafs

Clafs 81. *Model in Wax.*

June 3, 1762. Mr. Joseph Mofer, - - - 7 1 0

Clafs 80. *For an Historical Picture.*

June 16. Chevalier Andrew Cafali, first premium, - 105 0 0

Clafs 103. *Marble Statues.*

Mr. Nicholas Read, first premium, - 105 0 0

Mr. Samuel Harvey, fecond premium, - - - 52 10 0

Total. 157 10 0

Clafs 101. *For Landscape Painting.*

July 1. Paid Mr. John Smith, first premium, - 52 10 0

Clafs 107. *Baffo Relievos in Marble.*

Mr. Joseph Nollekens, - - - 52 10 0

Mr. Daniel Eggert, fecond premium in Clafs 108. - 26 5 0

Total 78 15 0

Clafs 102. *For Landscape Painting.*

Paid Mr. William Tomkins, fecond premium, - 26 5 0

July 26, 1762. Clafs 61. Mr. David Sands, - 4 4 0

Mr. William Penny, - - - 1 11 6

Total 5 15 6

Clafs 75. Mr. William Mitchell, - - 10 10 0

Clafs 62. Mr. Robert Dunkarton, - - 2 12 6

Mr. Ralph Wewitzer, - - 2 2 0

Mr. Thomas Brooks, - - 1 1 0

Total 5 15 0

September, 29, 1763. Clafs 54. Mr. John Parker, 10 10 0

Clafs 163. *Mezzotintos.*

Feb. 4. Mr. Jonathan Spilsbury, - 15 15 0

Clafs 173. *Cameos.*

Mr. Edward Burch, - - 21 0 0

Clafs 174. Mr. Nehemiah Spicer, - - 5 5 0

Clafs 175. *Intaglio.*

Mr. Nathaniel Marchant, - - 10 10 0

Clafs 176. *Intaglio.*

Mr. John Trewin, - - 21 0 0

Clafs 178. *Pastes.*

Mr. Samuel More - - 21 0 0

Clafs 157. *Models in Wax, by Girls.*

April 1. Miss Mary Robinson, second premium, - 3 3 0

Clafs 110. *Drawings at the Academy in St. Martin's Lane.*

Mr. Richard Earlom,	-	-	9	9	0
Mr. William Pennington,	-	-	3	3	0
Total			12	12	0

Clafs 142. *Medallions.*

Mr. John Taylor,	-	-	10	10	0
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Clafs 152. *Model in Clay.*

Mr. John Carter,	-	-	15	15	0
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Clafs 154. *For Models of Ornaments in Clay, by Youths under
22 Years of Age.*

Mr. George George,	-	-	7	7	0
Mr. John Scott,	-	-	5	5	0
Mr. Philip Regnart,	-	-	3	3	0
Total			15	15	0

Clafs 155. Mr. John Cuenot,	-	-	7	7	0
Mr. Lewis Robinson,	-	-	2	2	0
Mr. Henry Druit,	-	-	1	1	0
Total			10	10	0

Clafs 156. *Models in Wax.*

Mr. Joseph Moser,	-	-	12	12	0
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Clafs

Class 157. *Models in Wax, by Girls.*

Miss Mary Ann Hamilton, first premium,	-	5	5	0
Miss Mary Robinson, second premium,	-	3	3	0
Total		8	8	0

Class 169. *Engravings of human Figures.*

Mr. Henry Bryer,	-	21	0	0
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Class 111. *Drawings in the Duke of Richmond's Gallery.*

Mr. William Parry, first premium,	-	10	10	0
Mr. William Lawranson, second premium,	-	7	7	0
Total		17	17	0

Class 114. *Beasts, Birds, &c.*

April 15, 1763. Mr. John Parker, first premium,	5	5	0
Mr. John Hakewell, second premium,	-	4	4
		<hr/>	<hr/>
Total	9	9	0

Class 116. *Flowers, Fruit, &c.*

Mr. John Edwards,	-	7	7	0
Mr. John Kitchenman,	-	2	2	0
Mr. Thomas Hearn,	-	1	1	0
Total		10	10	0

Class

Class 119. *Ornaments for Weavers, under 20 Years of Age.*

Mr. William Woodward,	-	-	11	11	0
Mr. Francis Torrand,	-	-	6	6	0
Mr. Joseph Bumfries,	-	-	3	3	0
Mr. William Sharp,	-	-	2	2	0
Total			23	2	0

Class 120. *Ornaments for Weavers, by Youths under 16 Years of Age.*

Mr. Samuel Paris,	-	-	6	6	0
Mr. John Brown,	-	-	4	4	0
Mr. Thomas Brooks,	-	-	3	3	0
Total			13	13	0

Class 121. *Human Figures, by Youths under 14 Years of Age.*

Mr. David Sandys,	-	-	5	5	0
Mr. Christopher Towers,	-	-	4	4	0
Mr. William Mondett,	-	-	3	13	6
Mr. Robert Steel,	-	-	3	3	0
Mr. John Milbourn,	-	-	1	11	6
Mr. Richard Hurlstone	-	-	1	1	0
Total			18	18	0

Class 122. *Drawings of any Kind, under 14 Years of Age.*

Mr. Andrew Thornthwaite,	-	-	5	5	0
Mr. Moses Blanchard,	-	-	3	3	0
Mr. Ralph Wewitzer,	-	-	1	1	0
Total			9	9	0

Class 138. *Architecture.*

Mr. Edward Stevens,	-	-	21	0	0
Mr. Thomas Cooley,	-	-	10	10	0
Mr. James Gandon,	-	-	5	5	0
Total			36	15	0

Class 147. *Basso Relievos in Clay.*

April 15, 1763.	Mr. John Bacon,	-	-	10	10	0
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Class 181. *History Painting.*

Mr. Robert Edge Pine, first premium,	-	-	105	0	0
Mr. John Mortimer, second premium,	-	-	52	10	0
Mr. George Rumney, a bounty,	-	1	26	5	0
Total			183	15	0

Class 117. *Drawings of Fruit, &c. by Girls under 20 Years of Age.*

April 22.	Miss Ann Jones,	-	-	5	5	0
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Class 118. *Drawings of Ornaments, by Girls under 18 Years of Age.*

Miss Mary Fearon,	-	-	5	5	0
Miss Alice Morrison,	-	-	3	3	0
Total			8	8	0

Class.

Clafs 123. *Drawings of any Kind, by Girls under 15 Years of Age.*

Miss Elizabeth Graham,	-	-	4	4	0
Miss Penelope Graham,	-	-	1	11	6
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Total			5	15	6

Clafs 150. *Basso Relievo in Portland Stone.*

Mr. Thomas Banks,	-	-	31	10	0
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Clafs 183. *Landscape Painting.*

Mr. George Smith,	-	-	52	10	0
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Clafs 184. Mr. Charles Stuart,	-	-	26	5	0
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Clafs 185. Mr. Anthony Davis,	-	-	10	10	0
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Clafs 141. *Drawings in Architecture.*

May 20. Mr. John Plaw,	-	-	21	0	0
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Clafs 112. *Drawings of human Figures, from Models, Casts, &c.*

May 25. Mr. John Bellingham,	-	-	6	6	0
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Mr. William Pennington,	-	-	5	5	0
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Mr. John Terry,	-	-	4	4	0
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Mr. John Parker,	-	-	3	3	0
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Mr. Simon Watts,	-	-	2	2	0
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Total			21	0	0

Clafs

Class 113. *Drawings of an human Figure, after a Print or Drawing.*

Mr. Francis Wheatley,	-	-	7	7	0
Mr. William Gaftrell,	-	-	5	5	0
Mr. Robert Dunkarton	-	-	3	3	0
Mr. Philip Wickstead,	-	-	2	2	0
Total			17	17	0

Class 128. *Drawings of Landscapes after Nature.*

Mr. Johnson Carr,	-	-	15	15	0
Mr. Thomas Vivarez,	-	-	9	9	0
Mr. William Hodges,	-	-	6	6	0
Total			31	10	0

Class 160. *Etchings.*

Mr. Thomas Bonner,	-	-	10	10	0
Mr. James Record,	-	-	7	7	0
Total			17	17	0

Class 161. Miss Mary Vivarez, the whole premium, 10 10 0

Class 179. *Casting in Bronze.*

June 29. Mr. Nicholas Anderson, - - 42 0 0

Mr. Samuel Harvey, for a marble statue, - - 73 0 0

B b b.

Class.

Class 127. *For Drawings of an human Figure or Figures from Models.*

January 27, 1764. Mr. William Pennington,	-	8	0
Mr. Philip Wickstead,	-	7	7 0
Mr. Johnson Carr,	-	3	3 0
Mr. John Kitchenman,	-	2	2 0
Total		21	0 0

Class 128. *For Drawings of a single human Figure.*

Mr. William Lewen,	-	5	5 0
Mr. Thomas Brooks,	-	4	4 0
Mr. Studman Blake,	-	1	1 0
Mr. Richard Sparrow,	-	1	1 0
Total		11	11 0

Class 129. *For three or more human Figures.*

Mr. George Sykes,	-	7	7 0
Mr. David Sands,	-	5	5 0
Mr. Robert Dunkarton,	-	3	3 0
Total		15	15 0

Class 144. *Drawings of Landscapes after Nature.*

Mr. William Hodges,	-	15	15 0
Mr. Joseph Farrington,	-	9	9 0
Mr. John Fougeron,	-	6	6 0
Total		31	10 0

Class

Clafs 179. *For Engravings in Wood.*

Mr. Simon Watts,	-	-	15	15	0
Mr. James Deacon,	-	-	10	10	0
Total			26	5	0

Clafs 181. *For Etchings.*

January 27, 1764.	Mr. James Record,	-	8	8	0		
	Mr. Francis Torond,	-	-	5	5	0	
	Mr. Renne Rogers,	-	-	4	4	0	
	Mr. William Humphrey,	-	-	3	3	0	
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				Total	21	0	0

Clafs 187. *For Engraving Landscapes.*

Mr. Thomas Vivarez,	-	-	26	5	0
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Clafs 201. *For Cameo.*

Mr. Robert Staples,	-	-	5	5	0
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Clafs 205. *For Intaglio.*

Mr. Lewis Pingo,	-	-	21	0	0
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Clafs 207. *For Pastes.*

Mr. Samuel More,	-	-	21	0	0
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Clafs 213. *For Enamels.*

March 23. Mr. John Finlayson,	-	-	15	15	0
Mr. Charles Handafyde,	-	-	10	10	0
Total			26	5	0

Class 199. *For Cameos.*

Mr. Edward Burch,	-	-	10	10	0
Mr. Nehemiah Spicer	-	-	5	5	0
Total			15	15	0

Class 193. *For Engraving History.*

April 6. Mr. Henry Bryer,	-	-	21	0	0
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Class 211. *Chiaro Oscuros.*

April 24. Mr. Hugh Douglas Hamilton, first premium,	18	18	0
Mr. Edward Edwards, second premium,	-	-	7 7 0
Total			26 5 0

Class 215. *Painting Sea Pieces.*

Mr. Richard Wright,	-	-	31	10	0
Mr. Francis Swain,	-	-	15	15	0
Total			47	5	0

Class 217. *History Paintings.*

Mr. John Mortimer, first premium,	-	-	105	0	0
Mr. Mason Chamberlain, part of the second premium,	26	5	0		
Mr. William Pars, the other part of the second premium,	21	0	0		
Total			152	5	0

Clafs 219. *Landscape Paintings.*

Mr. George Barrett,	-	-	52	10	0
Mr. Daniel Bond,	-	-	26	5	0
Mr. Charles Stuart,	-	-	10	10	0
			<hr/>		
			89	5	0

Clafs 222. *For a Marble Statue.*

April 27.	Mr. Nicholas Read,	-	-	147	10	0
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Clafs 226. *For Basso Relievos in Marble.*

Mr. John Eckstein, first premium,	-	-	52	10	0
Mr. Lloyd Anderson Holm,	-	-	26	5	0
			<hr/>		
			Total	78	15 0

Clafs 126. *Drawings from the Duke of Richmond's Gallery.*

May 11, 1764.	Mr. William Pennington,	-	8	8	0
	Mr. John Hakewell,	-	6	6	0
	Mr. Hugh Baron,	-	4	4	0
			<hr/>		
			Total	18	18 0

Clafs

Class 130. *Drawings of human Figures or Heads, after Drawings or Prints.*

May 11, 1764. Mr. Robert Steel,	-	-	5	5	0
Mr. William Mondet,	-	-	4	4	0
Mr. Robert Hardy,	-	-	3	3	0
Mr. Philip Stevenart,	-	-	2	2	0
Mr. Richard Hurlstone,	-	-	1	1	0
Mr. John Milbourn,	-	-	1	1	0
Total			16	16	0

Class 138. *Drawings of Ornaments, by Youths under 20 Years of Age.*

May 27. Mr. William Woodward,	-	-	7	7	0
Mr. Samuel Paris,	-	-	4	4	0
Total			11	11	0

Class 141. *Drawings of any Kind, by Boys under 14 Years of Age.*

Mr. Andrew Thornthwaite,	-	-	5	5	0
Mr. John Alexander,	-	-	4	4	0
Mr. James Jones,	-	-	3	3	0
Total			12	12	0

Class 143. *Drawings of an Horse from Life, by Youths under 20 Years of Age.*

Mr. Thomas Hearn,	-	-	8	8	0
Mr. Christopher Finch,	-	-	7	7	0
Total			15	15	0

Clafs 157. *Designs in Architecture.*

Mr. James Gandon,	-	-	31	0	0
Mr. Thomas Cooley,	-	-	21	0	0
Mr. Robert Baldwin,	-	-	10	10	0
Total			62	10	0

Clafs 160. *Drawings in Architecture.*

Mr. James Pollard,	-	-	10	10	0
Mr. Richard Edwin,	-	-	7	7	0
Mr. Thomas Sutton,	-	-	3	3	0
Total			21	0	0

Clafs 161. *Historical Drawings.*

Mr. John Donaldson,	-	-	21	0	0
Mr. John Edwards,	-	-	5	5	0
Total			26	5	0

Clafs 163. *Medallion.*

May 25, 1766. Mr. John Taylor,	-	-	10	10	0
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Clafs 168. *Basso Relievos in Clay.*

Mr. John Bacon,	-	-	15	15	0
Mr. John Daintree,	-	-	5	5	0
Total			21	0	0
Clafs					

Class 173. *Models in Clay.*

Mr. Thomas Earlom,	-	-	5	5	0
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Class 175. *Models of Ornaments in Clay.*

Mr. George George,	-	-	6	6	0
Mr. John Scott,	-	-	4	4	0
Mr. Richard Haslewood,	-	-	3	3	0
Mr. Philip Regnart,	-	-	2	2	0
			<hr/>		
Total			15	15	0

Class 176. *Models of Ornaments in Clay.*

Mr. George Reynolds,	-	-	4	4	0
Mr. Charles Banks,	-	-	3	3	0
Mr. John Gilbert, jun.	-	-	2	2	0
Mr. Lewis Robinson,	-	-	1	1	0
			<hr/>		
Total			10	10	0

Class 177. *For the best Model in Wax.*

Mr. Albertes Pars,	-	-	10	10	0
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Class

Class 125. *Drawings at the Academy in St. Martin's Lane.*

June 1, 1764. Mr. William Parry,	-	-	8	8	0
Mr. William Lawrenson,	-	-	7	7	0
Mr. Johnson Carr,	-	-	6	6	0
Mr. Richard Earlom,	-	-	5	5	0
Mr. Thomas Jones,	-	-	3	3	0
Mr. Matthew Liart,	-	-	1	1	0
Total			31	10	0

Class 134. *Drawings of Fruit, &c. by Girls under 20 Years of Age.*

Miss Ann Jones,	-	-	3	3	0
Miss Mary Brooke,	-	-	2	2	0
Miss Mary Chambers,	-	-	1	1	0
Total			6	6	0

Class 135. *Drawings of Ornaments, by Girls under 20 Years of Age.*

Miss Mary Fearon,	-	-	3	3	0
Miss Ann Sherbon,	-	-	2	2	0
			5	5	0

Class 136. *Drawings for Weavers, by Girls under 18 Years of Age.*

Miss Alice Morrison,	-	-	6	6	0
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C c c

Class

Class 137. *Drawings or Compositions of Ornaments.*

Mr. John Bellingham,	-	-	10	10	0
Mr. William Sharp,	-	-	6	6	0
Mr. John Millar,	-	-	4	4	0
Total			21	0	0

Class 142. *Drawings of any Kind, by Girls under 15 Years of Age.*

Miss Elizabeth Sophia Tuckwell,	-	-	5	5	0
Miss Mary Bruce Strange,	-	-	4	4	0
Miss Elizabeth Graham,	-	-	3	3	0
Miss Ann Pars,	-	-	2	2	0
Miss Penelope Graham,	-	-	1	1	0
Total			15	15	0

Class 178. *Models of Ornaments in Wax, by Girls under 21 Years of Age.*

Miss Mary Robinson,	-	-	6	6	0
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Class 189, 190. *Engravings of History Pieces.*

Mr. Simon Francis Ravenet,	-	-	42	0	0
Mr. Francis Aliamet,	-	-	26	5	0
Total			68	5	0

Mr. James Keys, for fixing of Crayons, - - 31 0 0

Class 116. *Drawings at the Academy.*

Mr. William Lawrenson,	-	-	10	10	0
Mr. William Parry,	-	-	6	6	0
Mr. Thomas Jones,	-	-	4	4	0
Mr. Matthew Liart,	-	-	3	3	0
Total			24	3	0

Class 117. *Drawings from the Duke of Richmond's Gallery.*

Mr. William Pennington,	-	-	5	5	0
Mr. James Durno,	-	-	4	4	0
Mr. John Terry,	-	-	3	3	0
Total			12	12	0

Class 118. *Drawings of an human Figure, from Models, Casts, &c.*

Mr. John Kitchenman,	-	-	6	6	0
Mr. Hugh Barron,	-	-	4	4	0
Mr. Philip Wickstead,	-	-	2	2	0
Total			12	12	0

Class 119. *Drawings of an human Figure after a Print.*

Mr. John Milbourne,	-	-	5	5	0
Mr. John Beauvis,	-	-	3	3	0
Mr. Christopher Tower,	-	-	2	2	0
Mr. David Hennell,	-	-	1	1	0
Total			11	11	0

Class 120. *Drawings of human Figures in Groups.*

Mr. Thomas Brooks,	-	-	5	5	0
Mr. William Rogers,	-	-	3	3	0
Total			88	0	0

Class 121. *Drawings of human Figures or Heads, after Prints, &c.*

Mr. Andrew Vanrymsdyke,	-	-	8	8	0
Mr. Robert Morris,	-	-	5	5	0
Mr. Robert Montreavor,	-	-	4	4	0
Mr. John Wilmott,	-	-	3	3	0
Total			21	0	0

Class 133. *Drawings of a Horse from Life.*

Mr. Joseph Farrington,	-	-	10	10	0
Mr. John Fougeron,	-	-	6	6	0
Mr. John Frederick Miller,	-	-	4	4	0
Total			21	0	0

Class 170. *Etchings from Prints.*

Mr. Henry Crane Green,	-	-	7	7	0
Mr. Thomas Hearne,	-	-	5	5	0
Mr. Barnabas Mayor,	-	-	3	3	0
Mr. Knavenhuller Skinner,	-	-	1	1	0
Total			16	16	0

Class 172. *For scraping in Mezzotinto of a Portrait from any Picture of which there are no Prints.*

Mr. William Humphryes, first premium,	-	10	10	0
Mr. Samuel Okey, jun. second premium,	-	8	8	0
Total		18	18	0

Class 176. *Engravings of Landscapes with Figures.*

Mr. William Byrne,	-	26	5	0
Mr. Thomas Vivarez,	-	15	15	0
Total		42	0	0

Class 188. *Cameo Figure engraved on an Onyx, Representing the Head of Antinous.*

Mr. Lewis Pingo,	-	10	10	0
Mr. Nehemiah Spicer,	-	5	5	0
Total		15	15	0

Class 190. *Heads in Cameo, engraved on an Onyx, Representing the Head of Antinous.*

Mr. Robert Staples,	-	10	10	0
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Class 192. *Heads in Intaglio, engraved on a Carnelian, Representing the Head of Ganymede.*

Mr. John Frewin,	-	10	10	0
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Class 194. *Figures in Intaglio, engraved on an Oval red Carnelian, Representing the Dancing Fawn.*

Mr. Nathaniel Marchant,	-	21	0	0
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Class 196. *Pastes.*

Mr. Edward Carter,	-	-	10	10	0
Mr. Richard Frewin,	-	-	5	5	0
Total			15	15	0

Class 122. *Drawings of Birds, Beasts, &c.*

Mr. Robert Dunkarton,	-	-	4	4	0
Mr. James Lee,	-	-	2	2	0
Total			6	6	0

Class 124. *For the best Drawings or Compositions, being Originals of Fruit, Flowers, &c. under 20 Years of Age.*

Mr. Pierre Nicholas Petheu,	-	-	10	10	0
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Class 126. *Drawings or Compositions of Ornaments, by Girls under 18 Years of Age.*

Miss Jane Braim, first premium,	-	-	5	5	0
Miss Nancy Wilton, second premium,	-	-	4	4	0
Miss Ann Sherborn, third premium,	-	-	1	1	0
Total			10	10	0

Class 127. *Drawings for Weavers, &c.*

Miss Alice Morrison,	-	-	7	7	0
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Class 128. *For the best Drawings or Compositions, being Original Designs, fit for the Use of Embroiders, &c. by Youths under 20 Years of Age.*

Mr. William Lewin,	-	-	8	8	0
Mr. Hugh Clarke,	-	-	6	6	0
			<hr/>		
Total			14	14	0

Class 129. *For the best Drawings or Compositions, being Original Designs fit for the Use of Weavers, by Youths under 20 Years of Age.*

Mr. William Woodward,	-	-	4	4	0
Mr. Benjamin Pingo,	-	-	3	3	0
			<hr/>		
Total			7	7	0

Class 130. *For the best Drawings of any Kind (human Figures and Heads excepted) by Boys under 14 Years of Age.*

Mr. Richard Oakes,	-	-	5	5	0
Mr. Charles Gregnion,	-	-	3	3	0
Mr. John Wakelin,	-	-	2	2	0
Mr. John Atkinson,	-	-	1	1	0
			<hr/>		
Total			11	11	0

Class

Class 131. *Drawings of any Kinds, by Girls under 15 Years of Age.*

Miss Frances Dixon,	-	-	6	6	0
Miss Mary Bruce Strange,	-	-	5	5	0
Miss Elizabeth Sophia Tuckwell,	-	-	4	4	0
Miss Ann Parrs,	.	-	3	3	0
Miss Sophia Burnett,	-	-	2	2	0
Total			21	0	0

Class 203. *Original Historical Paintings in Enamel.*

Mr. John Donaldson,	-	-	21	0	0
Mr. Charles Handasyde,	-	-	15	15	0
Total			36	15	0

Class 146, 147, 148. *The best Design of the Side of a Street.*

Mr. George Richardson,	-	-	21	0	0
Mr. Thomas Cooley,	-	-	15	15	0
Mr. Robert Baldwin,	-	-	10	10	0
Total			47	5	0

Class

Class 149. *For the best Drawings of the Portico of St. George's Church, Hanover Square.*

Mr. James Pollard, first premium,	-	-	4	4	0
Mr. Andrew Thornthwaite, second premium,	-	-	3	3	0
Total			7	7	0

Class 155. *For the best Copper Medal.*

Mr. John Pingo,	-	-	31	10	0
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Class 159. *For the best Basso Relievo in Clay.*

Mr. John Bacon,	-	-	21	0	0
Mr. Thomas Sheemaker,	-	-	10	10	0
Mr. John Carter,	-	-	5	5	0
Total			36	15	0

Class 164. *For the best Models in Clay.*

Mr. Charles Banks,	-	-	15	15	0
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Class 166. *For the best Original Compositions, consisting of Birds, &c. by Youths under 20 Years of Age.*

Mr. Joseph Rose,	-	-	10	10	0
Mr. John Scott,	-	-	3	3	0
Mr. Philip Regnart,	-	-	2	2	0
Total			15	15	0

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Class

Clafs 167. *For the best Models of Ornaments in Clay, consisting of Birds, Beasts, &c. by Youths under 19 Years of Age.*

Mr. George Reynolds,	-	-	5	5	0
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Clafs 168. *For the best Models in Wax of Figures and Beasts, by Youths under 21 Years of Age.*

Mr. Albertus Pars,	-	-	8	8	0
Mr. Joseph Moser,	-	-	4	4	0
Mr. Richard Banfom,	-	-	3	3	0
			<hr/>		
Total			15	15	0

Clafs 178. *For the best Engravings of History Pieces.*

Mr. Thomas Chambers,	-	-	42	0	0
Mr. Francis Aliamet,	-	-	26	5	0
			<hr/>		
Total			68	5	0

Clafs 198. *For Casting in Bronze.*

Mr. Charles Frederick Maximilian Mellian,	-	-	21	0	0
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Clafs 200. *For the best Original Historical Picture in Claro Obscuro.*

Mr. Edward Edwards,	-	-	15	15	0
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Class 204, 205, 206. *For the best Original Sea Piece.*

Mr. Robert Wilkins,	-	-	31	10	0
Mr. Francis Swaine,	-	-	21	0	0
Mr. John Cleveley,	-	-	10	10	0
Total			63	0	0

Class 207, 208. *For the best Original Historical Pictures.*

Mr. Hugh Hamilton,	-	-	63	0	0
Mr. George Romney,	-	-	52	10	0
Total			115	10	0

Class 209, 210, 211. *For the best Original Landscapes.*

Mr. Daniel Bond,	-	-	52	10	0
Mr. Herbert Pugh,	-	-	26	5	0
Mr. Hugh Primrose Dean,	-	-	10	10	0
Total			89	5	0

Class 150. *For the best Historical Drawing, under 25 Years of Age.*

Mr. Richard Earlom,	-	-	15	15	0
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Class

Class 212, 213. *For the best Original Statue of a naked Figure as large as the Life, in white Marble.*

Mr. Laurits Anderson Holm,	-	-	147	0	0
Mr. Samuel Harvey,	-	-	84	0	0
Total			231	0	0

Class 216, 217. *For the best Basso Relievo, wrought in white Marble.*

Mr. John Fardinan Vander Mulin, first premium,			52	10	0
Mr. Thomas Banks, second premium,	-		26	5	0
Total			78	15	0

Bounties given for Casting in Bronze.

Mr. John Hazell,	-	-	26	5	0
Mr. I. S. Manley,	-	-	15	15	0
Total			42	0	0

Gave a Gratuity for a Survey of the County of Devon.

Mr. Benjamin Down,	-	-	100	0	0
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Class 121. *Drawings of human Figures, from Models, Casts, &c. by Youths under 20 Years of Age.*

Mr. John Kitchenman,	-	-	8	8	0
Mr. James Durno,	-	-	4	4	0
Mr. Hugh Baron,	-	-	3	3	0
Total			15	15	0

Class 138. *Drawings of Landscapes after Nature, by Youths under 19 Years of Age.*

Mr. Joseph Farrington, first premium,	-	15	15	0
Mr. Francis Wheatley, second premium,	.	5	5	0
Total		21	0	0

Class 167. *For the best Scraping in Mezzotinto, by young Women, under 25 Years of Age.*

Miss Mary Vivarez,	-	6	6	0
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Class 179. *For the best Intaglio, engraved on a Carnelian.*

Mr. Edward Burch,	-	10	10	0
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Class 166. *For the best Scraping in Mezzotinto, by young Men under 25 Years of Age.*

Mr. William Humphreys,	-	15	15	0
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Class 128. *Drawings of a human Figure in Groups, by Youths under 16 Years of Age.*

Mr. Thomas Rider,	-	6	6	0
Mr. Richard Atkinson,	-	4	4	0
Total		10	10	0

Class 122. *Drawings of a human Figure after a Print or Drawing, by Youths under 16 Years of Age.*

Mr. James Roberts,	-	3	3	0
Mr. Richard Oakes,	-	2	2	0
Total		5	5	0

Class 124. *Drawings of human Figures or Heads, after Drawings or Prints, by Boys under 14 Years of Age.*

Mr. Andrew Van Rymodyke,	-	-	10	10	0
Mr. William Augustus Barron,	-	-	6	6	0
Mr. James Rouby,	-	-	4	4	0
			<hr/>		
			Total	21	0 0

Class 162. *For the best Etching Copy from any Print, not less than nine Inches by six, by Youths under 21 Years of Age.*

Mr. Robert Stubbs,	-	-	10	10	0
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Class 127. *Drawings of Fruits, Flowers, &c.*

Mr. Robert Dunkarton,	-	-	6	6	0
Mr. James Paul Atkinson,	-	-	4	4	0
			<hr/>		
			Total	10	10 0

Class 128. *Drawings of Fruit, Flowers, &c. by Girls.*

Miss Jane Braime, the only premium,	-	-	4	4	0
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Class 135. *Drawings of any Kind, by Boys.*

Mr. Francis White,	-	-	4	4	0
Mr. Charles Ruben Riley,	-	-	3	13	6
Mr. William Price,	-	-	3	3	0
Mr. Augustus Toufaint,	-	-	1	11	6
Mr. Josiah Smith,	-	-	1	1	0
			<hr/>		
			Total	13	13 0

Class 137. *Drawing of a Horse.*

Mr. John Paris,	-	-	1	1	0
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Clafs 164. *Etchings of History Pieces.*

Mr. Richard Earlom,	-	-	21	0	0
Mr. Thomas Vivarez,	-	-	5	5	0
Total			26	5	0

Clafs 167. Miss Mary Vivarez, - - 6 6 0

Clafs 128. *Drawings of Fruit, Flowers, &c. by Girls.*

Miss Jane Braime, the only premium, - - 4 4 0

Clafs 135. *Drawings of any Kind by Boys.*

Mr. Francis White,	-	-	4	4	0
Mr. Charles Ruben Riley,	-	-	3	13	0
Mr. William Price,	-	-	3	3	0
Mr. Augustin Toufaint,	-	-	1	11	0
Mr. Josiah Smith,	-	-	1	1	0
Total			13	13	0

Clafs 137. *Drawings of a Horse.*

Mr. John Paris, - - 1 1 0

Clafs 164. *Etchings of History Pieces.*

Mr. Richard Earlom,	-	-	21	0	0
Mr. Thomas Vivarez,	-	-	5	5	0
Total			26	5	0

Clafs 167. Miss Mary Vivarez, - - 6 6 0

Class 179. Mr. Edward Burch, - - 10 10 0

Class 181. Mr. Nathaniel Marchant, - - 15 15 0

Class 131. Mr. John Best, - - 4 4 0

Class 129. *Drawings of Ornaments, by Girls under 20 Years of Age.*

Miss Ann Pars, - - 3 3 0

Class 132. *Drawings of Ornaments for the Use of Weavers.*

Mr. Samuel Paris, first premium, - - 14 14 0

Mr. Benjamin Pingo, second premium, - 6 6 0

Total 21 0 0

Class 136. *Drawings of any Kind, by Girls.*

Miss Frances Dickson, first premium, - - 8 8 0

Miss Alice Williams, second premium, - - 6 6 0

Miss Isabella Blackburne, third premium, - 3 3 0

Miss Sophia Burnet, fourth premium, - - 2 2 0

Miss Martha Isaacs, - - 1 1 0

Total 21 0 0

Class 119. *Drawings at the Academy in St. Martin's Lane.*

Mr. William Lawrenson, first premium, - - 5 5 0

Mr. John Berridge, second premium, - - 4 4 0

Total 9 9 0

Class 151. *Historical Drawings.*

Mr. William Parry, - - 15 15 0

Clafs 170. *For Engravings of History Pieces.*

Mr. Thomas Chambers, firſt premium,	-	42	0	0
Mr. John Millar, ſecond premium,	-	26	5	0
Total		68	5	0

Clafs 172. *Drawings of an human Figure.*

Mr. Matthew Liart,	-	21	0	0
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Clafs 157. *For the beſt Baſſo Relievo in Portland Stone.*

Mr. James Calvert,	-	15	15	0
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Clafs 183. *For Caſting in Bronze.*

Mr. John Hazel,	-	21	0	0
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Clafs 185. *Chiaro Ofcuro.*

Chevalier Andrew Cafali,	-	52	10	0
Mr. Peter Falconet,	-	26	5	0
Total		78	15	0

Clafs 189, 190, 191. *Sea Pieces.*

Mr. Richard Wright, firſt premium,	-	52	10	0
Mr. Thomas Mitchell, ſecond premium,	-	26	5	0
Mr. Robert Wilkins, third premium,	-	10	10	0
Total		89	5	0

Clafs 196. *For Baſſo Relievos in white Marble.*

Mr. Thomas Sheemaker,	-	52	10	0
Mr. Thomas Banks,	-	10	10	0
Total		63	0	0

E c c

Clafs

Clafs 103. *For drawing of a Landscape.*

Mr. Thomas Hearn,	-	-	6	6	0
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Clafs 122. *For an Etching.*

Miss Mary Vivarez,	-	-	10	10	0
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Clafs 123. *For Mezzotintos.*

Mr. Robert Dunkarton,	-	-	12	12	0
Mr. William Dickenson,	-	-	8	8	0
Mr. Samuel Okey, jun.	-	-	5	5	0
			<hr/>		
		Total	26	5	0

Clafs 116. *For Basso Relievo in Clay.*

Mr. Charles Brooks,	-	-	21	0	0
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Clafs 127. *For Casting in Bronze.*

Mr. Albertus Pars,	-	-	10	10	0
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Clafs 102. *Patterns for Weavers.*

Mr. John Edwards, part of the premium,	-		12	12	0
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Clafs 128. *Landscapes.*

Mr. Thomas Jones,	-	-	31	10	0
Mr. John Gardner,	-	-	26	5	0
			<hr/>		
		Total	57	15	0

Clafs

Clafs 93. *Drawings at the Academy in St. Martin's Lane.*

Mr. Philip Renigal,	-	-	4	4	0
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Clafs 131. *Basso Relievos in Marble.*

Mr. John Ferdinand Vander Mulin, first premium,		31	10	0
Mr. Theodore Ballant, second premium,	-	26	5	0
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Total		57	15	0

Clafs 124. *Marble Statues.*

Mr. Lawrance P. Holmes,	-	-	42	0	0
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Mr. James Taffie, a bounty for Portraits in Pafte,		10	10	0
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Mr. Burdett, a gratuity for a Survey of the County of Derby,	-	-	-	100	0	0
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Clafs 102. *For Patterns for Weavers.*

Mr. William Nailor, part of a premium,	-	6	6	0
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Clafs 115. *History Painting.*

Mr. Peter Falconet, second premium, first not given,		26	5	0
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Clafs

Class 111, 112. *Landscape Paintings.*

Mr. Nicholas Thomas Dall, first premium,	-	31	10	0
Mr. Thomas Jones, second premium,	-	26	5	0
Total		57	15	0

Class 106. *Basso Relievo in Clay.*

Mr. John Flexman, jun.	-	10	10	0
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Class 102. *Patterns for Weavers.*

Mr. John Tuvin, part of the premium,	-	10	10	0
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Class 113. *Sea Pieces.*

Mr. Richard Wright,	-	52	10	0
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Class 114. *Painting in Enamel.*

Mr. John Donaldson,	-	31	10	0
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Madame Fleury Deremunt, for artificial flowers,	-	3	3	0
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Class 92. *For Drawings of Ornamental Furniture.*

Mr. Thomas Banks,	£	21	0	0
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Class

Class 86. *For Intaglio.*

Mr. Robert Staples,	-	-	5	5	0
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Miss Ann Hewit, a bounty, for drawings and plates,			10	10	0
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Miss Mary Braddock, a bounty, for artificial flowers made of straw,	-	-	-	5	5	0
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Class 113. *Landscape Painting.*

Mr. John Alexander Gresse,	-	-	10	10	0
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Class 112. Mr. Edmund Garvey, part of the first premium,			21	0	0
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Class 116. *History Painting.*

Mr. Hugh Douglas Hamilton, part of the first premium,			15	15	0
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For a Model in Clay of Prometheus, as large as Life.

Mr. Thomas Banks,	-	-	21	0	0
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Captain Armstrong, a bounty, for the map of Northumber- land,	-	-	52	10	0
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Class 135. *For Drawings after Life.*

Mr. Edward Edwards, a bounty,	-	-	6	6	0
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Miss. Mary Elizabeth Jones, a bounty for a basket of artificial
flowers, - - - 2 2 0

Class 146. *For History Painting.*

Mr. James Durno, - - - 31 10

Class 142. Mr. James Lambart, part of the premium, 15 10 0

Mr. Edmund Garvey, a bounty for a landscape, 10 10 0

Class 130. Mr. Thomas Burges, part of the premium for historical
drawings - - - 5 5 0

Class 140. *For History Painting.*

Mr. James Durno, jun. a premium, - - - 105 0 0

Mr. John Bacon, a bounty for a figure of Mars, as large as Life,
in plaster, - - - 21 0 0

Hono-

Honorary Premiums and Bounties given in POLITE ARTS.

1758. **T**O Lady Louisa Greville, for a drawing, a silver medal.
1759. To Miss Mary Moser, for extraordinary merit in drawing a vase of flowers, a silver medal.
- To Lady Louisa Greville, for etching a view near Warwick, a gold medal.
1760. To Miss Clayborn Cosley, for etching a landscape, a gold medal.
- To Miss Maria Hoare, for an historical drawing, a gold medal.
- To Miss Moore, for a drawing, a silver medal.
1767. To Mr. Charles Ruben Riley, for an academy figure, a silver pallet.
- To Mr. Andrew Van Rymfdyke, for a drawing, a gilt pallet.
- To Mr. John Flaxman, for a basso relievo in clay, a gilt pallet.
- To Mr. Augustus Toussaint, for a drawing from pictures, &c. a silver pallet.
- To Mr. Charles Grignion, for a drawing from pictures, &c. a silver pallet.
- To Mr. Robert Dighton, for a drawing of a head with a pen, a bounty of a silver pallet.
- To Mr. Andrew Dickie, for excellent penmanship, a bounty of a gold pen.
- 1768-9. To Mr. Francis Moore, for drawing after a picture, a silver pallet.
- To Mr. David Watts, for drawing of outlines, a gilt pallet.
- To Mr. E. Addis, for a drawing of outlines, a bounty of a silver pallet.

1769-70. To Mr. Benjamin Pingo, for a pattern for weavers,
a gold pallet.

To Mr. Abraham Mondet, for a pattern for weavers, a gilt pallet.

To Mr. John Flaxman, for a model in clay, a gilt pallet.

To Mr. E. Edwards, for an historical drawing, a gold pallet.

To Mr. Lewis Pingo, for a model in wax, a gilt pallet.

To Mr. John Kitchenman, for a drawing from the life, a gold pallet.

To Mr. Thomas Clark, for a drawing from the life, a silver pallet.

To Mr. Charles Ruben Riley, for a drawing from plaister, a gold pallet.

To Mr. William Smith, for a drawing of outlines, a gilt pallet.

To Mr. Thomas Cooke, for a drawing of outlines, a silver pallet.

To Mr. George Farrington, for drawing of a landscape, a gilt pallet.

To Miss Ann Hewit, for drawings of flowers, a gilt pallet.

1770-1. To Mr. Robert Laurie, for drawing after pictures,
a gilt pallet.

To Mr. Henry Stubble, for drawing after pictures, a silver pallet.

To Mr. Richard Siffel, for drawing for weavers, a gilt pallet.

To Mr. Lewis Pingo, for a model of a medal, a gold pallet.

To Mr. John Flaxman, for a basso relievo in clay, a gold pallet.

To Mr. Richard Reed, for a drawing of outlines, a gilt pallet.

To Mr. Leonard Willamot, for a drawing of outlines, a gilt pallet.

To Mr. Joseph Slater, for drawing of horses, a gilt pallet.

To Mr. John Shelley, for drawing in Indian ink, a silver pallet.

F I N I S.



